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and
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The Outlook

Freight Transport Aircraft

TWO American shipbuilders have propounded an enterprising scheme for building transport aircraft in their shipyards, and one of them thinks that in ten months he would be in a position to turn out the machines at the rate of 5,000 a year, all 70-ton cargo aircraft. Officials at the War Production Board of the United States do not seem enamoured of the idea, pointing out that the plan would divert materials from other aircraft which are urgently needed by the armed forces. Supporters of the plan say that machines of this type could be largely built of wood, and there is much force in that argument. *Flight* has often urged that wood could be used more freely in certain types, and the practice has been adopted in making some trainers, gliders and more ambitious types, so that there should be no difficulty in extending it to transport aircraft. Engines, of course, are a different matter, and really large transport machines would need plenty of power. It is a question whether engines now badly needed for bombers, fighters, etc., could be spared in large numbers for transport aircraft.

The shipbuilder who avers that his yards could be in full production in ten months, and turning out aircraft on a really large scale, strikes us as an optimist. Shipyards are not ideal places for rapid conversion into aircraft factories; but wherever they are to be made there is need for the United Nations to have transport aircraft, and a committee of the United States Senate is looking into the question of producing them. It will be remembered that Mr. Churchill said in the House of Commons on July 2nd. "At this moment, much though we need transporter aircraft, I am not at all sure if I were offered a gift of 1,000 heavy bombers or 1,000 transporters which I should choose. Well, I should take advice."

The Prime Minister when he uttered these words knew about the losses of shipping off the coast of America, and at that time the public had not been informed about them. Since then the U.S. War Shipping Administration has published some very disturbing facts. In the week which ended on Sunday, July 19th, the shipping losses were the heaviest in any week since the war began, and recent sinkings of Allied vessels have greatly exceeded production. Transport aircraft cannot take the place of ships in bringing across heavy stuff in bulk, but they could do something, indeed a great deal, in easing the present serious situation.

Moreover, though the Atlantic is the most important sea area to be considered, it is not the only one. There is also the Mediterranean. Larger quantities of priceless supplies could doubtless be sent to Gen. Auchinleck by air which at present have to go slowly by ship all round the Cape. They do not run the same risks as supplies flown across the Mediterranean, but the time factor is very important. It may be that a decision will have been reached in Egypt and Libya before air transport on any effective scale could be made available, but the war in the Middle East will not necessarily stop with that decision. Syria, Iraq, Iran and India have also to be kept up to strength, and it would be a great advantage if we could quickly fly certain supplies out to those countries. It is to be hoped that the Committee of the U.S. Senate will be able to find some way of meeting the need without undue delay.

You Have Been Warned

WE wonder how many Germans have been fined, sent to concentration camps, or perhaps even shot, for listening to the broadcast by Air Marshal Sir Arthur Harris, A.O.C.-in-C., Bomber Command, on July 28th. Certainly some of the nation of would-be *Herrenvolk* must have heard it, and probably a good many. It can hardly be hoped that the various nationalities of the Third Reich will rise (unarmed as they are) and attempt to overthrow the Nazi regime at a moment when they are all doubtless expecting that their armies will reduce Russia to impotence at any moment, before American assistance can put the United Nations in a commanding position. None the less, the warning given by the head of the R.A.F. Bomber Command can hardly have cheered up German listeners or raised their *moral* to a higher level. They must all have realised that the prospect held out by Sir Arthur can and will be translated into fact.

Some Germans must have a conscience left, and that conscience will tell them that it was Germany and its rulers who started the practice of bombing the countries of their opponents. Americans who were in Berlin when some of the first of Lord Beaverbrook's "beautiful bombs" fell there reported that though some Berliners cursed the R.A.F., quite as many confessed: "Well, we started it."

Sir Arthur was careful to emphasise that our present policy is not dictated by revenge, "though we do not forget Warsaw, Belgrade, Rotterdam, London, Plymouth and Coventry." The R.A.F. is striking at German war production, and will continue to do so. The workers in the war factories must inevitably suffer, and they are the class on whom the prospect held out by Sir Arthur is likely to have the greatest effect. The pity of it is that so many of them are people forced into the work from the occupied countries. They know, however, that blows struck at German war effort are blows which help to set their hapless countries free. The German workmen have no such consolation. Those of them who heard, or heard of, this broadcast must be feeling distinctly depressed—and that feeling does not make for the best output.

The effect of breaking civilian "will to win" is always hard to calculate. Military discipline counts for much, and the Germans are naturally a disciplined people. But every soldier has civilian relatives, and if the German armies are defeated, demoralisation may spread like a plague.

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"BOMBERS OF COASTAL COMMAND ATTACKED ENEMY SHIPPING": Hudsons of the Demon Squadron—Royal Canadian Air Force, now operating in Britain—patrolling over the North Sea.

War in the Air

A U.S. Army Kittyhawk taking off from an improvised runway in Northern Australia.

Hamburg Heavily Battered : The Luftwaffe Over Britain : Russia's Grim Struggle : Air Activity in the Middle East

HAMBURG has been a favourite target of Bomber Command ever since the beginning of the war, but it seems now that the lighter bombs which were dropped on it in the early days did only limited damage. Still, the succession of raids and destruction all mounted up, though they did not prevent Hamburg from remaining the most important centre for building U-boats in all Germany. With the U-boat campaign in the Western Atlantic now reaching a peak which is distinctly disquieting to both Britain and America, it has become more urgent than ever to restrain the German shipyards from replacing the submarines which the escort vessels of the United Nations sink. If Bomber Command can do that to any appreciable extent, it will have struck a very useful blow to help in winning the war. The coming of the four-engined bomber in numbers enables its strokes to have a weight which was not possible in the first two years of the war.

Never before had Hamburg had such a battering as it received on the night of Sunday, July 26th. The moon was bright, and a strong force of bombers set out in three waves. It was pointed out that that full moon was the first one of the summer which shone in a night long enough to bring Hamburg within range of a powerful raid. While the main force flew towards the great seaport, other bombers attacked airfields in the Low Countries by way of a diversion. The first wave which reached Hamburg dropped

TO FIRE BOMB FRITZ : Canisters of incendiary bombs waiting to be loaded into the aircraft racks. In the big Hamburg raid over 170,000 incendiaries were dropped in 35 minutes.

WAR IN THE AIR

mainly fire bombs, and the second wave had more fire bombs than high explosives in the racks. Within 35 minutes over 175,000 fire bombs had fallen on the place and fires sprang up in all directions. A wind carried the smoke aside, so that the targets still showed up in the combined light of the moon and the flames. Then the third wave flew over and unloaded its high explosives, including many of the 4,000 lb. bombs. This last attack only lasted a quarter of an hour, and it must have been indeed a *mauvais quatre d'heure* for Hamburg.

The dose was repeated on the night of Tuesday, July 28th, but the weather did not favour our bombers. It has been described as "freak." All the way there our crews were struggling against adverse conditions, storms and icing, and some navigators did not find their way to the target. It seems probable that some were forced down over enemy territory, in which case the crews would be taken prisoner. Those who arrived found a solid bank of clouds rather low down over Hamburg, and the pilots came down below it to bomb, thus presenting a good target to the defences. Large fires were started down below. There were also diversion raids on airfields in the Low Countries.

Hamburg is probably the most strongly defended place in all Germany against air attack, and it was not to be expected that our raids could be carried through without loss. Altogether 29 bombers were lost during the Sunday night, and 32 on the Tuesday. One mourns for the loss of gallant men, but perhaps an undue emphasis is placed on air losses by the prompt publication of the numbers. General Auchinleck's soldiers never make an advance without losing men and tanks, while a naval action often costs us far more in lives and expensive material than is ever suffered in any air encounter. It is right to publish air losses promptly, but for the public to think (as it seems inclined to do) that air losses are more lamentable than naval or military losses is to lose a sense of proportion. The most pathetic of all losses of life in this war are those suffered so resolutely by the Merchant Navy—but we only hear details of them on rare occasions.

The Russians Hard Pressed

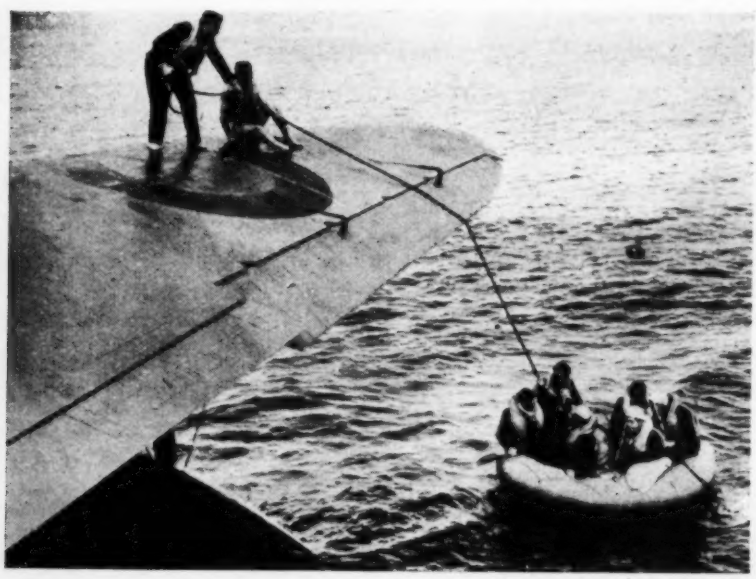
OUR allies in Russia have been hard pressed, and the loss of Rostov and other places is serious enough. Their spokesmen have been saying openly that the operations of the R.A.F. Bomber Command do not interest them, except for propaganda purposes. They want an Allied force to land in Europe and attack the German forces from the west. Everybody wants that to happen, but it would be folly for our leaders to allow themselves into being stampeded. They show no signs of such imbecility. As a member of the Government said not long ago, the worst thing which could happen would be to make the attempt and fail. The Battle of Egypt is a second front, and to fight it out is the best thing which Britain can do at the moment. Obviously, General Auchinleck is still short of heavy tanks—or at least he has not got enough to overwhelm Rommel. Until the supply organisation has been able to send him enough to put him in a commanding position, it would be futile to think of amassing tanks for an invasion of the Continent—let alone consideration of shipping and innumerable other things. We are sure that Mr. Stalin understands that point as clearly as Mr. Churchill does, but there are less important people in Russia, as in Britain, who shout before they think.

Though the Russians have been able to spare some bombers for a series of raids on East Prussia, they are making no attempt to "win the war in the air." Neither are the Germans. On the eastern battle front the bombers on both sides are being used mainly as long-range and mobile artillery, with sometimes some close-range work to do on pontoon bridges and suchlike. The fighters play their orthodox parts overhead. There seems no definite air superiority on either side; but the Germans have an advantage in better communications behind their lines, and in the possession of large numbers of transport aircraft. The Russians cannot transport all the ground impedimenta of a bomber squadron from one important point to another so easily as the Germans can do.

By the same token, it is interesting to read that some Bombays are at work in Egypt, and bring up supplies to Gen. Auchinleck's front line.

Raids on Britain

THE Germans cannot have very many bombers in the west, for they need all the aircraft they can muster on the Russian front, and in Libya Rommel has been left on the short side. The *Luftwaffe's* tactics in the west have been to make as much show as possible with a few bombers, and for Dr. Goebbels to tell the German people that Great Britain is being hit as hard (or nearly so) as Duisberg and Hamburg have recently been hit. One night last week the *Luftwaffe* commander in France scraped together about 60 to 70 bombers and sent most of them to Birmingham. The German wireless announced that it was a force of 200. There have been frequent small raids on towns on the coast of East Anglia, and single machines have ventured across by day when there has been cloud cover and have dropped bombs here and there, sometimes machine-gunning the streets of towns which it was thought safe to attack. These raiders have not escaped unscathed. The Birmingham raid cost the *Luftwaffe* nine machines. That was a very substantial proportion of the force sent over, and the commander in France must have been con-



SAVED : A Sunderland flying boat picking up the crew of a Whitley which came down in the sea while on anti-submarine patrol.

siderably annoyed at losing so many aircraft from his rather exiguous force. Next night eight more German raiders were destroyed. New A.A. projectiles have been in use, and German prisoners say that they are called "the pilot's terror." Scarcely a day passes without some German raider falling a victim to the patrolling Spitfires.

Holing the Boilers

FIGHTER Command is very much on the aggressive this summer, and of late it has specialised on attacking railway engines and goods trains in France and the Low Countries, as well as joining with the Navy in sinking supply ships along the coast of the Continent. A cannon shell through the boiler of a locomotive does not necessarily destroy the engine outright, but it certainly sends it into hospital for some time; while if a goods train is badly derailed, the line may be blocked for a considerable time. The German communications system is stretched to the uttermost just now, and every such interruption is very good work.

On the night of Wednesday, July 29th, Bomber Command switched its attentions to Saarbrücken, a great centre of coal mining and of the iron industry, as well as a most important railway junction. Most of the strong force of bombers were able to find and bomb their targets, while clouds gave cover on the way out and back. Only nine machines were lost.

On the same night Axis raiders visited Cairo, but confined their attentions to the outskirts, where they did little damage. No doubt they were restrained by the threat to Rome. Several reconnaissance "snoopers" have lately been shot down by our fighters over or off Alexandria. There has been reduced activity over Malta, though each day the defenders shoot down a few Axis aircraft. In the western desert there has also been a lull for several days, the reason for which is not yet apparent.

In New Guinea, on the other hand, there has been brisk fighting, both on the ground and in the air. July 29 was also a lively day in that area, for Allied aircraft scored direct hits on a Japanese destroyer off the coast of Gona, and she was last seen heading for the shore with smoke pouring from her. Perhaps she is done for; at least it means more work for the Japanese repair docks.

BITING THE DUST: The pilot and rear gunner of a Junkers Ju 87 brought down by Bofors gunfire in Egypt. A close-up interior view of the rear gun mounting appears on page 148. This mounting is now used on all German bombers.

"Flight" photograph.

FOR HIGH-SPEED RECONNAISSANCE: Starting up a section of Army Co-operation Command Mustangs.

HERE AND THERE

90th Birthday Celebration

MR. HANS RENOLD, founder and director of the Renold and Coventry Chain Co., Ltd., attained his 90th birthday on July 31st.

This milestone in a long and eventful life has been marked by the employees of the company by the establishment of a fund to be known as the "Hans Renold 90th Birthday Commemoration Fund," the annual investment income from which is to provide prizes for students of mechanical engineering.

Air Crews from U.K.

THE United Kingdom will supply 40 per cent. of the air crew recruits to be trained in Canada under the new British Commonwealth Air Training Plan agreement, it was disclosed when the agreement was tabled in the House of Commons at Ottawa by the Hon. C. G. Power, Air Minister. That will leave 60 per cent. of the recruits to be supplied by Canada, Australia and New Zealand, the other nations participating in the agreement.

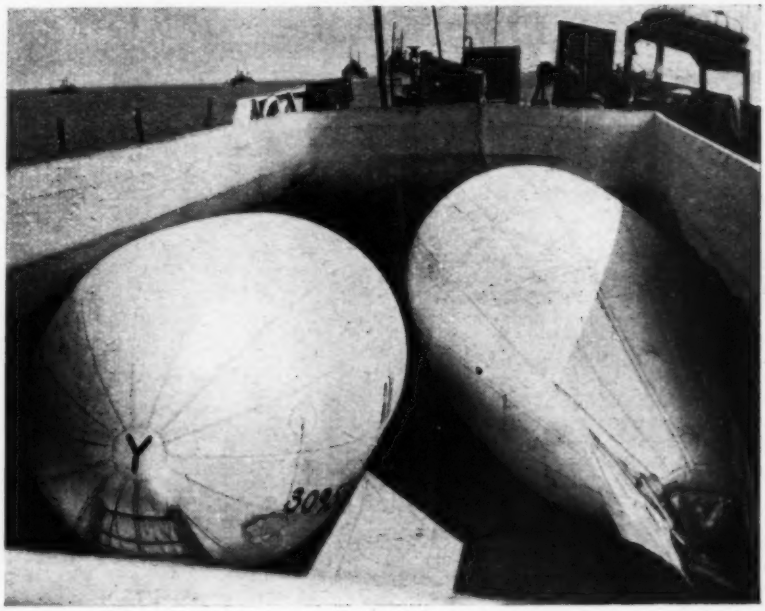
Under the original agreement of 1939, to be replaced by the new one as from July 1st, Canada provided 80 per cent. of the trainees and the other three countries the remaining 20 per cent.

R.A.F. Exhibition at Selfridge's

AN exhibition on the third floor of Selfridge's was opened on July 30th by Lord Sherwood, Under-Secretary of State for Air. It is entitled "The R.A.F. in Action," and consists mostly of a fine selection of photographs, together with specimens of rubber dinghies, a machine-gun, a 20-mm. cannon, a bomb sight, an aircraft camera, models of Allied and Axis aircraft, and other attractions.

The photographs are arranged in sections to illustrate the work of the different R.A.F. Commands and ancillary organisations such as the W.A.A.F. and the A.T.C.

As might be expected, the Army Co-operation Command is the most reserved in setting forth its doings, while the W.A.A.F. is the most revealing. In the latter section the photograph of a bathing parade is sure to be a popular attraction.



LITTLE SISTER: A smaller relative of the familiar barrage balloon, the kite balloon, is "flown" by merchant ships in convoy to confound the enemy Stuka and is proving a most useful umbrella. Stored in barges, as shown here, they are taken out to waiting ships by Naval drifters which also collect them from incoming ships.

HIGH-SPEED SERVICE: W.A.A.F. workshop hands clean the engines and nacelles of a Wellington at a maintenance unit while fabric workers patch and dope its wings. This service was recently executed on a Coastal Command Whitley in record time by a squad of "Waafs."

Cuts in T.C.A. Services

TO meet war requirements, Trans-Canada Air Lines is now operating only two daily flights from Toronto to New York, having discontinued the morning flight. The northbound service has been similarly curtailed.

The two flights remaining will handle the international air mail, air express and wartime passenger service. The line into New York is the only operation into the United States now conducted by a Canadian organisation under agreement between the Governments, and it forms an important link between the two countries.

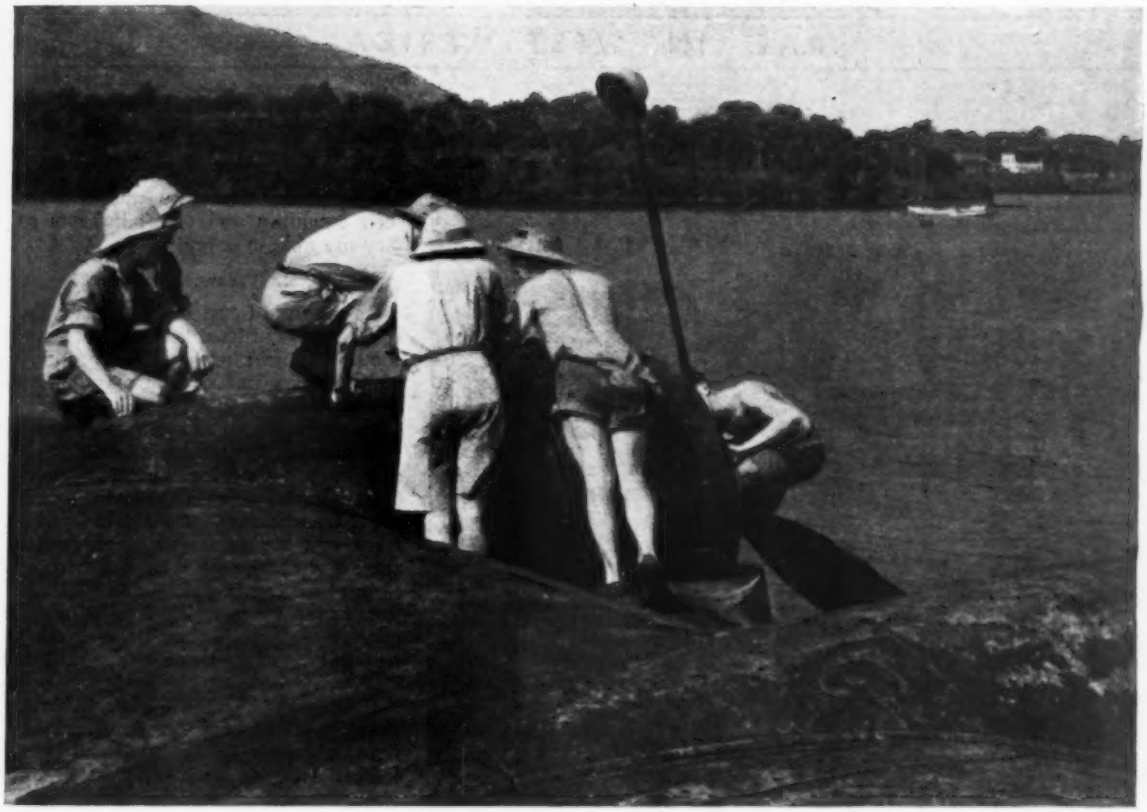
Incidentally, Trans-Canada, Canada's nationally owned airline, is operating more than 4,000 miles of mainline from St. John's, Newfoundland, to the Pacific Coast at Vancouver on a wartime basis.

Office Boy to Director

A RECENT appointment to the board of Bell's Asbestos and Engineering, Ltd., is that of Mr. E. C. Little, who has just entered upon his 55th year of continuous service with the company.

He joined Bell's—who, in addition to their United Kingdom organisation, possess oversea companies in Australia, India and South Africa—as an office boy in July, 1888. Four years ago, on completing his half century, Mr. Little was Overseas Companies Manager, and among the gifts he received on that occasion in recognition of his record, were a silver salver from the directors, a motor car and cheque from the company, and a gold watch from all the employees.

Mr. Little has served with four generations of the Bell family, and to-day is as energetic as ever.



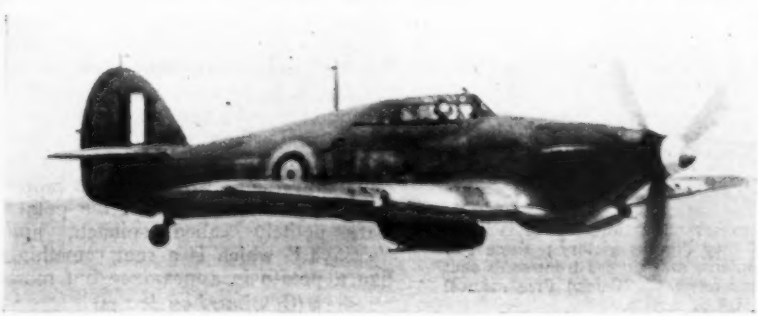
A maintenance crew of a flying-boat base prepare a Sunderland for its next anti-submarine patrol. Note the airscrew blade in temporary use as a hat-stand.

R.A.F. IN WEST AFRICA

It's a Tough Life, But They Keep Fit and Cheerful : Petrol-tin Baths and Plenty of Fruit

BOMBER raids on Germany, fighter sweeps over the Continental coastline, the twenty-four-hour day vigilance of Coastal Command, and the incessant hammering of Rommel's supply lines in Libya by the Allied Air Forces—these activities of our airmen are in the news daily, but little is ever said of the equally vital work of the R.A.F. at West Africa's coastal stations from which the anti-submarine patrols guard our South Atlantic sea routes via the Cape. Yet, remembering the present position in the Mediterranean, the importance of this work cannot be exaggerated.

Air Comdre. E. A. B. Rice, O.B.E., M.C., the Air Officer Commanding, West Africa.



Like all aircraft in this and similar parts of the world, this patrolling Hurricane has been "tropicalised" a process which includes the fitting of a special air-intake with Vokes air cleaner.

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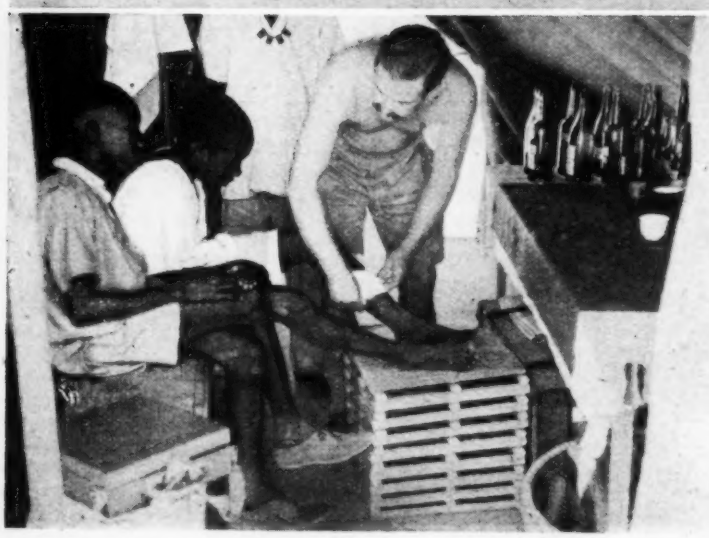
R.A.F. IN WEST AFRICA



(Top) The white man's love of bathing arouses native interest—or is it his transport? (Centre) Even in West Africa they dig for victory; these two sergeants have grown tomatoes, potatoes, onions, and zinnias from seeds sent from home—but one was a market gardener anyway. (Below) Free medical attention is "all part of the R.A.F. service."

Life varies considerably for the officers and men stationed on these distant airfields and flying-boat bases, but generally speaking they depend almost entirely upon their own initiative for such amenities and entertainments as they are able to enjoy.

Their Worst Enemies

On the Gold Coast and in Nigeria the R.A.F. have at least the advantages of good permanent buildings and properly built quarters, but in Gambia and Sierra Leone life is pretty tough. In some cases operational units live under canvas or in iron Nissen huts which get extremely hot during the day. Moreover, summer rains make living under canvas particularly unpleasant, and a wary eye has to be kept for certain species of unfriendly "natives" in the form of snakes, scorpions and similarly unwelcome visitors, which show a disconcerting desire to share not only one's tent but one's bed and one's bath as well.

White ants constitute a particularly destructive enemy, since they have an insatiable appetite for such things as leather baggage and equipment, tent canvas, and even the tent pegs. Wooden buildings, unless specially treated, eventually collapse from the ravages of these insects.

Nevertheless, the men of the R.A.F., living and doing their arduous job in this war under every conceivable climatic condition to be found from the arctic to the tropics, are proving themselves thoroughly capable of dealing with the worst problems that West Africa can set for the white man; even his most treasured amenity, the bathroom, is not entirely ruled out, though it necessarily takes a somewhat primitive form—a four-gallon petrol tin slung aloft and tipped by the pulling of a string to provide a shower.

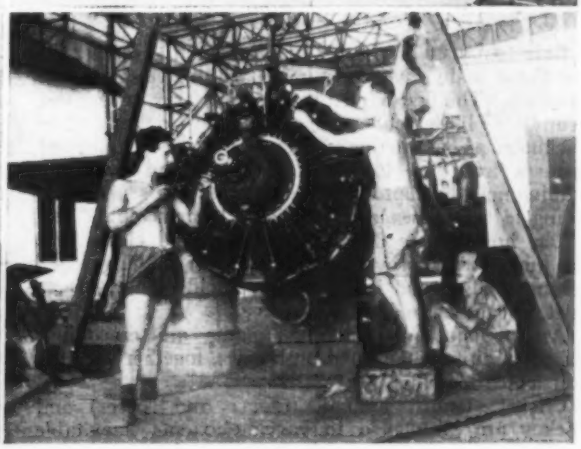
African boys, now accustomed to the white *bwana's* inexplicable love of water externally applied, obligingly maintain the essential supply and keep the tins filled.

Ample Rations

Thanks to the West African Army Service Corps, the essentials of life in the way of rations are ample, with the exception of green vegetables, which are scarce, and which hardly come up to European or American standards. In the main, the "two veg" are represented by a species of native potato leaf, politely called spinach, and "casava," which is a root something like a potato in appearance but more

(*Continued on p.* 144)

CAMP COOKHOUSE : Easily the most important building, of course, is the cookhouse, however far-flung the outpost of Empire. In the background can be glimpsed the fuselage of an American transport aircraft in use as offices. The trees are Rumn palms and provide building timber—but not for aircraft construction !



(Left, top) Outside the thatched mud church, the padre and another officer chat to the "head boy" of the officers' mess and (bottom), the padre displays a pair of altar candlesticks made for him by one of the villagers. (Right, top) R.A.F. ground staff attend to a Hurricane, and (bottom) change the engine of a Maryland in a West African hangar.

R.A.F. IN WEST AFRICA

The indispensable morning tub is a tricky business.

like a compound of glue and sawdust to eat; names bestowed upon this delicacy by the imaginative minds of R.A.F. personnel are not suitable for inclusion in the chaste columns of *Flight*.

But, by way of compensation, the aerial guardians of the South Atlantic enjoy a fruit which the war has rendered temporarily extinct in their home country—the banana! This almost forgotten dessert is quite plentiful on the West African air stations, and so are oranges, their prices being twopence and a penny each respectively. This, by the way, is regarded out there as expensive, because before the war such fruit was practically given away for the asking.

Eggs are also fairly plentiful at 2d. each, while chickens cost 2s. 6d. to 3s. apiece. Additionally there are, in the more southern colonies, such strange-sounding fruits as paw-paws, mangoes and Avocado pears, all of which are plentiful in their season.

Outdoor Sports

Entertainment is essentially of the outdoor variety, the three main diversions being bathing, fishing and shooting. The first-named pastime can only be enjoyed in anything like safety on the coast, owing to the extreme likelihood of contracting any one of several unpleasant diseases from the local river water. But even sea bathing must be kept within certain common-sense limits owing to the presence of sharks and barracouta. The water, however, is delightfully warm and clean, and the huge rollers provide wonderful surf bathing. Sea fishing is also good if one can get hold of a canoe or boat, but these are decidedly scarce.

As for shooting, the chief game are crocodiles, baboons, hippopotami and bush cows, together with the odd leopard or lion.

Cricket, tennis, football (rugger and soccer) and hockey are all played to varying extents—inevitable where Britons forgather whatever the difficulties—and even those who normally find cricket lacking in excitement have to admit that the frequency with which one

Proud of his "Last war" ribbons, this West African veteran is congratulated by the pilot of a Sunderland flying boat, based near his village.

"C.O. FIGHTERS": This squadron leader's Hurricane carries 14 iron crosses on its flank, one for each of his kills during the present war (but not, of course, in West Africa). He also has more than 30 probables to his credit.

of the station's pet monkeys will join the fielders and scamper off with the ball lends a refreshing novelty to this old English custom.

In spite of the extremities of the climate, the worst feature of which is its excessive humidity, our airmen keep amazingly fit and, it need hardly be said, equally cheerful. One thing any newcomer to their ranks has to remember if he wishes to keep on the right side of the local inhabitants is that the word "native" is frowned upon almost as severely as that disparaging term "nigger" used to be.

Our dusky fellow members of the British Empire quite rightly expect to be known as West Africans (the white population being "Europeans"), many of them having served in the West African Frontier Force in the 1914-18 war, and many thousands having enlisted in the present conflict.

The village and district chiefs are frequently men of great dignity, and they dispense considerable hospitality, whilst the Emiris and Sultans of Nigeria are definitely African princes.

Nevertheless, it has to be admitted that the West Coast Africans are about the laziest people in the world.

TOTAL WAR

Text of Bomber Chief's Warning to Germany by Radio

WE in Britain know quite enough about air raids. For ten months your *Luftwaffe* bombed us. First you bombed us by day. When we made this impossible, they came by night. Then you had a big fleet of bombers. Your airmen fought well. They bombed London for 92 nights running. They made heavy raids on Coventry, Plymouth, Liverpool, and other British cities. They did a lot of damage. Forty-three thousand British men, women and children lost their lives. Many of our most cherished historical buildings were destroyed.

You thought, and Göring promised you, that you would be safe from bombs. And, indeed, during all that time we could only send over a small number of aircraft in return. But now it is just the other way. Now you send only a few aircraft against us, and we are bombing Germany heavily.

Why are we doing so? It is not revenge, though we do not forget Warsaw, Belgrade, Rotterdam, London, Plymouth and Coventry. We are bombing Germany, city by city, and ever more terribly, in order to make it impossible for you to go on with the war. That is our object. We shall pursue it remorselessly. City by city: Lübeck, Rostock, Cologne, Emden, Bremen, Wilhelmshaven, Duisburg, Hamburg—and the list will grow longer and longer. Let the Nazis drag you down to disaster with them if you will. That is for you to decide.

In fine weather we bomb you by night. Already 1,000 bombers go to one town, like Cologne, and destroy a third of it in an hour's bombing. We know; we have the photographs. In cloudy weather we bomb your factories and shipyards by day. We have done that as far away as Danzig. We are coming by day and by night. No part of the Reich is safe.

Military Targets

In Cologne, on the Ruhr, or at Rostock, Lübeck, or Emden, you may think that already our bombing amounts to something. But we do not think so. In comparison with what it will be like as soon as our own production of bombers comes to a flood and as American production doubles and then redoubles, all that has happened to you so far will seem very little.

I will speak frankly to you about whether we bomb single military targets or whole cities. Obviously we prefer to hit factories, shipyards and railways. It damages Hitler's war machine most. But those people who work in these plants live close to them. Therefore, we hit your houses and you. We regret the necessity for this. The workers of the Humboldt-Deutz, the diesel-engine plant in Cologne, for instance —some of whom were killed on the night of May 30 last —must inevitably take the risk of war. Just as our merchant seamen who man ships which the U-boats (equipped with Humboldt-Deutz engines) would have tried to torpedo. Were not the aircraft workers, their wives and children, at Coventry just as much "civilians" as the aircraft workers at Rostock and their families? But Hitler wanted it that way.

It is true that your defences inflict losses on our bombers. Your leaders try to comfort you by telling you that our losses are so heavy that we shall not be able to go on bombing you very much longer. Whoever believes that will be bitterly disappointed. I, who command the British bombers, will tell you what our losses are. Less than 5 per cent. of the bombers which we send over Germany are lost. Such a percentage of loss does very little even to check the constant increase ensured by the ever-increasing output of our own and the American factories.

Air Marshal Sir Arthur Travers Harris, K.C.B., O.B.E., A.F.C., Air Officer Commanding-in-Chief, Bomber Command.

Allied Strength

America has only just entered the fight in Europe. The first squadrons, forerunners of a whole air fleet, have arrived in England from the United States of America. Do you realise what it will mean to you when they bomb Germany also? In one American factory alone, the new Ford plant at Willow Run, Detroit, they are already turning out one four-engined bomber able to carry four tons of bombs to any part of the Reich every two hours. There are scores of other such factories in the United States of America. You cannot bomb those factories. Your submarines cannot even try to prevent those Atlantic bombers from getting here; for they fly across the Atlantic.

Soon we shall be coming every night and every day, rain, blow, or snow—we and the Americans. I have just spent eight months in America, so I know exactly what is coming. We are going to scourge the Third Reich from end to end if you make it necessary for us to do so. You cannot stop it, and you know it.

You have no chance. You could not defeat us in 1940, when we were almost unarmed and stood alone. Your leaders were crazy to attack Russia as well as America (but then your leaders are crazy; the whole world thinks so excepting Italy).

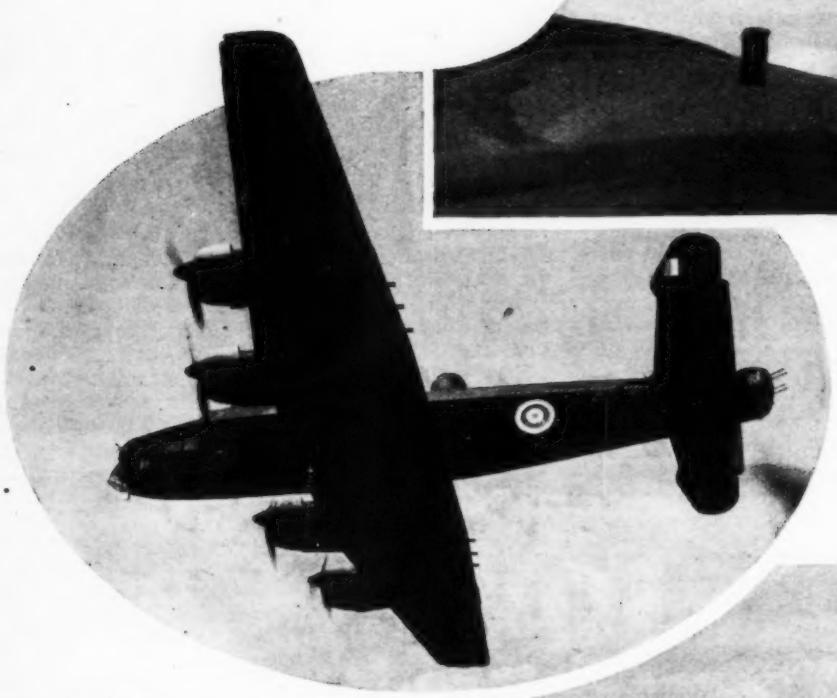
How can you hope to win now that we are getting ever stronger, having both Russia and America as allies, while you are getting more and more exhausted?

Remember this: no matter how far your armies march they can never get to England. They could not get here when we were unarmed. Whatever their victories, you will still have to settle the air war with us and America. You can never win that. But we are doing so already now.

One final thing: It is up to you to end the war and the bombing. You can overthrow the Nazis and make peace. It is not true that we plan a peace of revenge. That is a German propaganda lie. But we shall certainly make it impossible for any German Government to start a total war again. And is not that as necessary in your own interests as in ours?

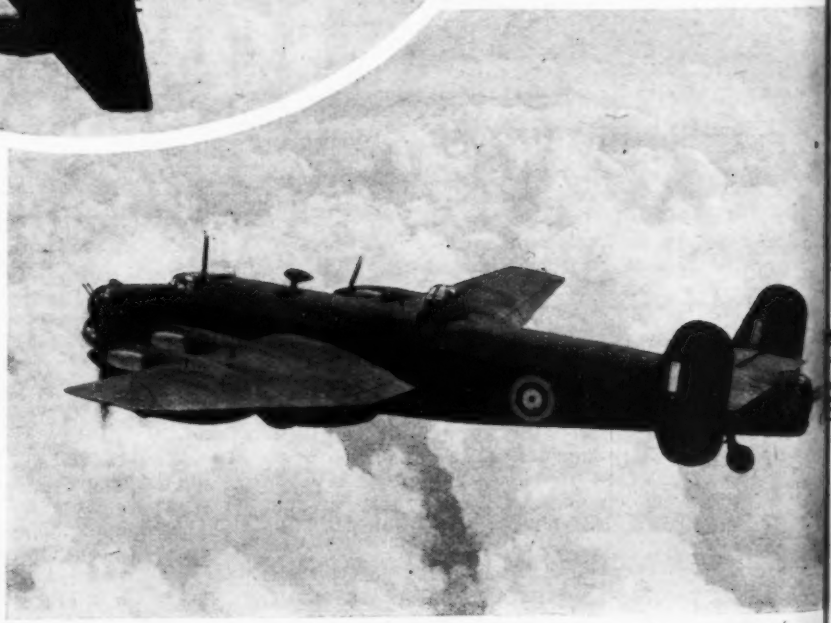
HANDLEY PAGE HALIFAX

Some Detail Sketches, and a New Set of Striking Photographs by Our Chief Photographer of a Halifax Being Put Through Its Paces by Flt. Lt. J. R. Talbot, Handley Page's Chief Test Pilot

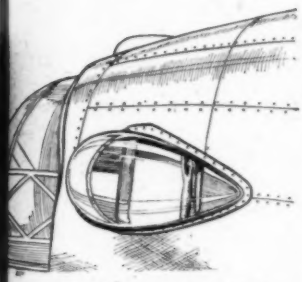


The above photograph of a Halifax in formation with the photographer's aircraft shows how manoeuvrable it is despite its 27 tons all-up weight. Of interest also in this picture are the asbestos muffs over the exhaust ports which damp the exhaust flames while flying at night and make it more difficult for the enemy night fighters to spot the machine.

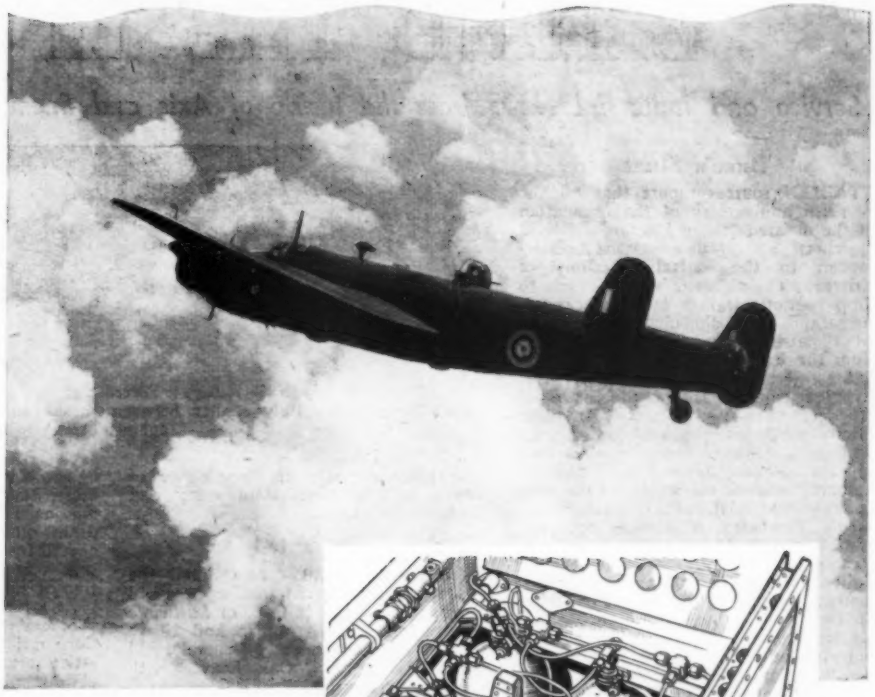
(Above) As the Halifax turns away the dead-black paint of the underside puts the machine in silhouette. The three projections behind the trailing edge of each wing are the pipes used to jettison fuel in case of emergency.



(Right) A three-quarter rear view which emphasises the excellent field of fire covered by the three power-operated gun turrets. For all its 99ft. span the Halifax is a graceful machine and appears smaller than it actually is.



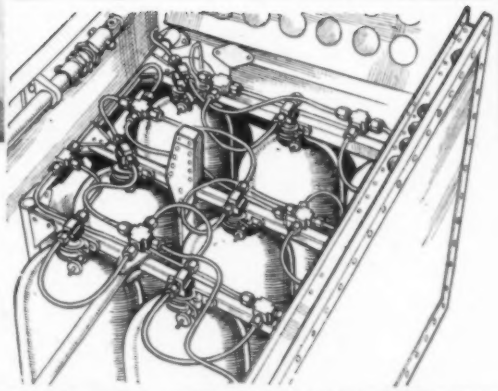
The two-gun turret and streamlined see - behind blister in the nose.

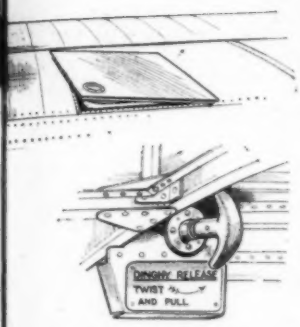


(Above) The Handley Page Halifax has not only proved itself a formidable bomber, but also has earned itself an enviable reputation for shooting down enemy fighters.

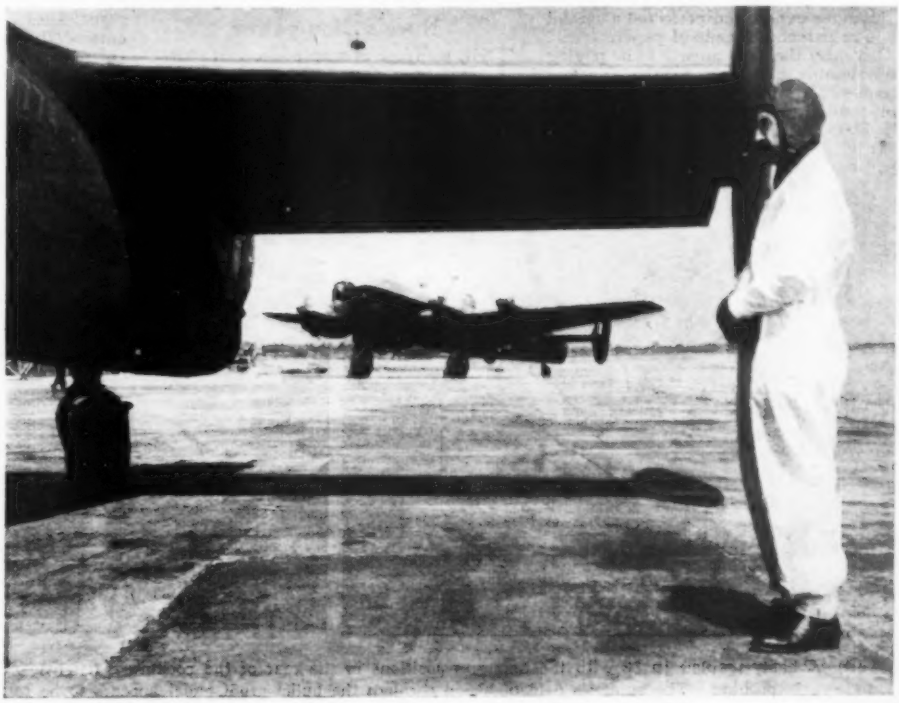
(Right) Oxygen-bottle storage in the floor behind the pilot.

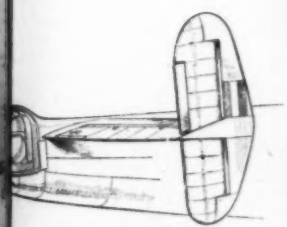
(Below) A study of a Halifax as seen from beneath the tail of a sister aircraft.





Two sketches showing how the inflatable dinghy is stowed in the wing and the method of release.





A sketch of the tail-plane with its "end-plate" fins and rudders. The rear turret has a traverse of 180 degrees.

BEHIND THE LINES

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

Duce's Stunt

ITALIAN sources report that on the sixth anniversary of the foundation of the ill-fated Italian Empire, a Savoia Marchetti, S.M.75, flew over the Mediterranean to the ex-Italian colony of Eritrea. The object of the flight was to drop patriotic leaflets over the capital, Asmara. It is difficult to understand what patriotic zeal the Duce expects from the Eritrean natives.

At any rate, they must prefer this harmless paper appeal to the castor oil treatment of the pre-war days. It is also interesting to note that the crew engaged on this flight was composed of crack men of the *Regia Aeronautica*, namely, Colonel Paradiso, the winner of the 1937 International Istres-Paris air race; Lieut. Vaschetto, a wireless operator, who flew with Balbo in 1932 and was recently on the South Atlantic service; Capt. Magini, a long-range navigator instructor, and Sgt. Trovi, an old-timer of the *Regia*, who flew with Balbo's Mediterranean squadron in 1928, and only recently was on the staff of the L.A.T.I. South Atlantic service.

All members of this crew engaged upon this stunt are now serving with the "Bruno Mussolini" long-range bomber squadron, considered to be a crack unit of Italy's Air Force.

Jap Paratroops

FLIGHT, February 5th issue ("Behind the Lines"), reported the formation of a Parachutist Corps in Japan. It was then stated that about 12,000 soldiers volunteered for training. On another occasion it was reported that a Japanese expert had perfected a special type of parachute made of paper.

Recently the Japs appear to be paying considerable attention to the development of their paratroop units, and have substantially increased the strength of the Parachutist Corps.

It is also reported from Japan that large-scale manœuvres of parachutists took place recently in the vicinity of Tokyo in the presence of army and Government leaders.

PROTECTION AGAINST R.A.F.: Aircraft of the *Regia Aeronautica* on an airfield in Southern Italy shelter between these concrete walls to protect them against blast.

Promoted

HITLER'S special decree dated the 19th instant conferred upon Field Marshal Kesselring C.-in-C. of *Luftwaffe* units in the Mediterranean and North African area, the rank of General Field Marshal and the "Oak Leaves with Swords" to the Knights Insignia of the Iron Cross.

The citation order states that Field Marshal Kesselring's units, in close co-operation with the Italian Air Force, have concentrated their attacks during the winter 1941-42 on Malta and have thus "considerably eased the problem of supplies to the North African theatre of war." It is further stated that equally important was the support given by Kesselring's air and flak units in the push towards Egypt and the capture of Bir Hakeim and Tobruk.

Duce's Man-power

THE shortage of man-power and particularly of skilled labour has induced the Italian Government to embark on a new drive for the rationalising of industry. The losses incurred by the Italian armies in East Africa, North Africa and Russia and the constant demands of the Nazis for the supply of more Italian labourers are the main reasons for this shortage. A further drain on the available man-power is caused by intensified farming and by the urgent necessity to increase the production of substitute products.

At a meeting of the Fascist Industrial Workers' Association, the Minister of Corporations, Ricci, announced that strict measures will be taken to rationalise the industry, and to release more man-power for the essential branches of production, particularly for farming. While details of the plan have not been announced, it was stated that the Italian plan will differ entirely from the usual procedure of concentration of industry. A special body representing the industry and the Munition Ministry will take charge of the new policy.

Brazil's Gain

THE transatlantic service of the Italian Company, L.A.T.I., was suspended immediately the U.S.A. entered the war. Since then the Italian company has been trying to save part of its equipment in Brazil by endeavouring to sell it to the Argentine Government.

It is now reported that the Government of Brazil has seized a number of Savoia Marchetti three-engined aircraft stationed in their country.

(Left) A badly mauled Ju 88 with the new gun positions in the rear of the cockpit. (Right) The inside view of this gun position. The gunner's field of vision through the bullet-proof panel appears to be rather restricted.

POLISH SQUADRONS IN THE R.A.F.

Limited Independence Within the R.A.F.: How Polish Units Were Formed, and Some of Their Exploits

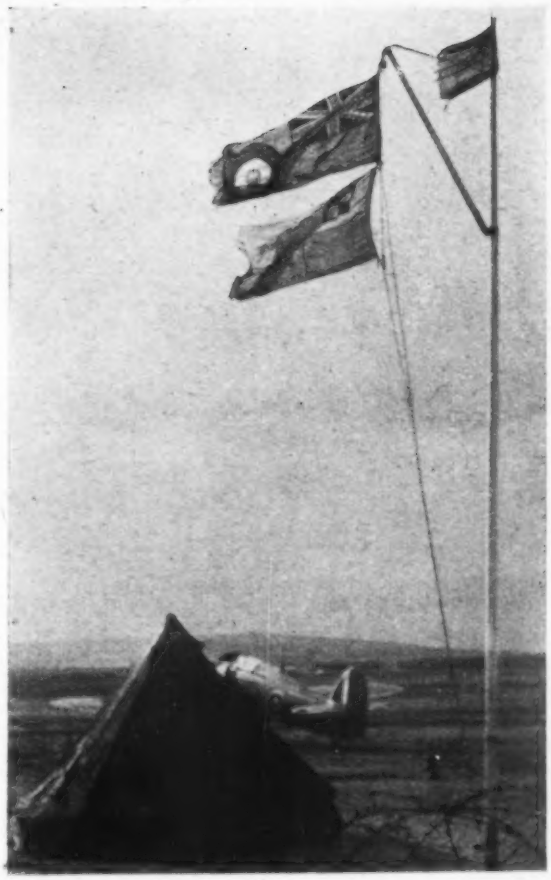
By HENRY BAERLEIN

"THE Polish Air Force has ceased to exist," exclaimed Goering, intoxicated by the victory of the 3,000 German aircraft over Poland's 314; and those 3,000 were modern aircraft of various types, while Poland's were mostly out-of-date machines. Yet, despite this handicap, heavy casualties were inflicted on the *Luftwaffe*; it is no exaggeration to say that the Germans lost in Poland 800-1,000 aircraft, and, in order to justify this result, Goering asserted that 800 Polish machines were engaged.

As for the Polish Air Force having ceased to exist, there was as much truth in this as in Goering's other notorious statement to the effect that no British bomb would ever fall upon German soil, for, in compliance with orders, 90 per cent. of the Polish airmen left to renew the struggle elsewhere, and approximately 20 per cent. of air equipment was evacuated to Rumania. The pilots themselves, on their way to France or Great Britain, were pursued by agents of the Gestapo and often imprisoned or interned in Rumania, Hungary, Lithuania and Latvia. At the end of 1939 and early in 1940 considerable numbers of Poles crossed over to Britain, where they looked forward to having modern aircraft at their disposal.

Much to Learn

"Here in England," said one of them, "we were given the means to go on fighting. There was much to learn. Few of us could speak the language. None of us had flown Hurricanes or Spitfires. Their instruments were marked in strange measures, pounds, feet, gallons, which we had to translate mentally into kilos, metres and litres. The mechanics' lot was easier. They just set to work, stripping and reassembling the machinery. There was no need to talk. A mechanic's fingers speak the same tongue in all countries. From dawn until far into the night we worked, and in two months we went into action."



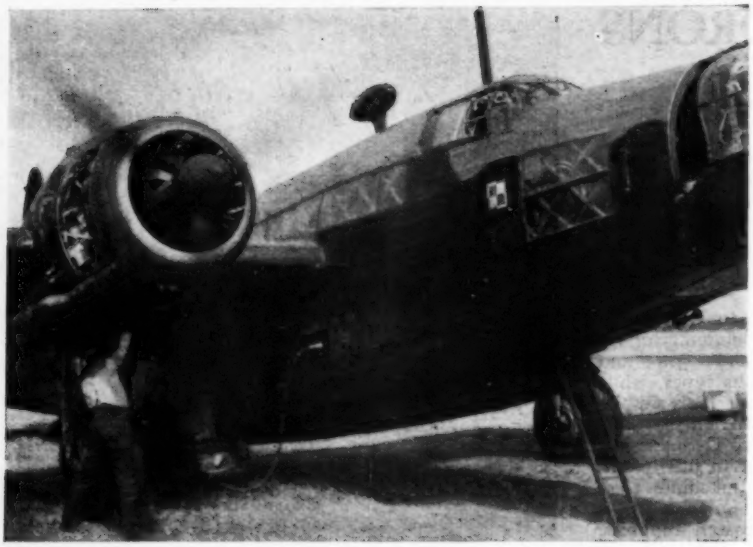
Under two flags. The R.A.F. and Polish ensigns symbolise the close comradeship which has developed between the two services.

As for the Polish airmen who had been left in France, awaiting the arrival of new equipment, it seemed that the French did not understand these Allies. Their temperament and their eagerness to fight were incomprehensible to the average Frenchman. History will in due course reveal why there was so great a delay in providing the Poles with aircraft; it will probably fail to disclose why 140 Polish fighter pilots, instead of being organised into entirely Polish units, were dispersed among French squadrons. But, in spite of every obstacle, Polish pilots even in France managed to achieve some success. Though there were no Polish bombers to take part in the Battle of France, the Polish fighters brought down about 69 enemy aircraft with the loss of 15 pilots.

The Poles are equally adept at scoring bull's eyes on a German aircraft and on the dartboard. Scene in a Polish squadron's crew room.

In the Battle of Britain

It then became necessary for the Polish airmen in France to join their compatriots in Britain, where they were welcomed wholeheartedly by the R.A.F. One month after the collapse of France the first Polish fighter squadron, No. 303, came into existence and took part in the Battle of Britain. This squadron played a very important rôle at the decisive moment of the battle. With the loss of only seven pilots, the Polish fighters brought down 117 German aircraft, with a further



Tuning up one of the Pegasus engines in a Wellington of a Polish squadron. The red-and-white "chess board" on the side of the fuselage is the badge of the Polish Air Force.

number of probables and damaged machines to their credit.

To-day, after two years of the struggle, the official record of the Polish fighters in Great Britain (up to July 10th, 1942) is as follows: 463 enemy aircraft brought down for certain, with 110 probables and 124 damaged. One must remember that to-day, when dog-fighting takes place but sporadically over France, the opportunities for bringing down enemy aircraft are much smaller.

The Polish bomber squadrons have co-operated with the R.A.F. since September, 1940. Up to July 10th, 1942, 2,987 Polish bomber crews took part in the raids. The fact that, as Sir Archibald Sinclair stated in a letter to the Polish Commander-in-Chief, over 100 Polish crews participated in the "four-figure" raids over Cologne and Essen—Sir Archibald emphasising their share in the destruction of enemy war industry—indicates that when Goering made the above mentioned remark he was thinking very wishfully. Up to June 1st, 1942, the Polish Bomber Squadrons had released over the enemy a load of 7,200,000 pounds of high explosives and incendiaries.

To-day the Polish Air Force, to a certain degree independent, is fighting as a part of the R.A.F. Comprising a part of this organisation, it is at the same time a part of the Polish armed forces. This two-fold dependence creates, of course, several problems which can be settled only by mutual understanding and good-will.

Independence

The independence of the Polish Air Force as part of the Polish armed forces is shown by the existence of the Inspectorate of the Polish Air Force, which is the nucleus of the future command of the Air Force in Poland. The Inspector of the Polish Air Force is directly subordinate to the C. in C.

Within the frame of the R.A.F. the independence of the Polish Air Force is naturally restricted. The Inspectorate has the decisive voice in matters of general organisation and personnel. The general direction of training, matters of administration and supply are in British hands. The tactical command remains entirely with the Poles; the operational command so far belongs to the staff of the several commanding officers of the R.A.F.

The Polish operational air force comprises a considerable number of fighter, bomber and co-operation squadrons. The whole personnel of the squadrons, crews and ground staff is Polish. Polish officers command bomber squadrons, fighter squadrons and wings. Polish flying schools assure the exchange of operational pilots and the replenishment of losses. Observers and air gunners assembled in Polish units get their basic training in British schools, while all crews receive their battle training in Polish battle-training units.

Polish ground staffs not employed in Polish squadrons and schools have until now worked at British stations. Polish parking units have been formed, which comprise Polish executive as well as directing technical personnel. Meteorological posts and stations are manned by Polish personnel.

Courses for ground staff and the training of new personnel take place partly at the Polish centre for ground staff and partly at British schools. Soldiers of former Polish balloon units are serving with British units and at balloon plants. A certain number of technical officers and N.C.O.s who are specialists are working in aircraft factories and research stations of the R.A.F. Flying personnel not fit for serving with fighting units are employed at non-operational British units.

In the Middle East there is a separate detachment of the Polish Air Force working with one of the Commands of the R.A.F. Younger pilots of this detachment have been given permission for training with fighting units, and are now with one of the fighter squadrons of the R.A.F.

Polish armourer reloading the guns of a Spitfire on its return to base from one of its numerous flights against the enemy.

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E

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AIRCRAFT TYPES AND H

Halifax and Stirling

THERE are men living in this country to-day who were deprived ("deprived" is the right word) of the chance to bomb Berlin in the last war by the sudden surrender of the Kaiser's army in November, 1918. Those men would have set out on their great adventure in Handley Page V/1500 bombers. These machines, the biggest anyone had seen at that time, were four-engined aircraft, and special bombs weighing 3,500 lb. had been designed for "special delivery" to the enemy's unscathed capital. At the eleventh hour the raid was cancelled.

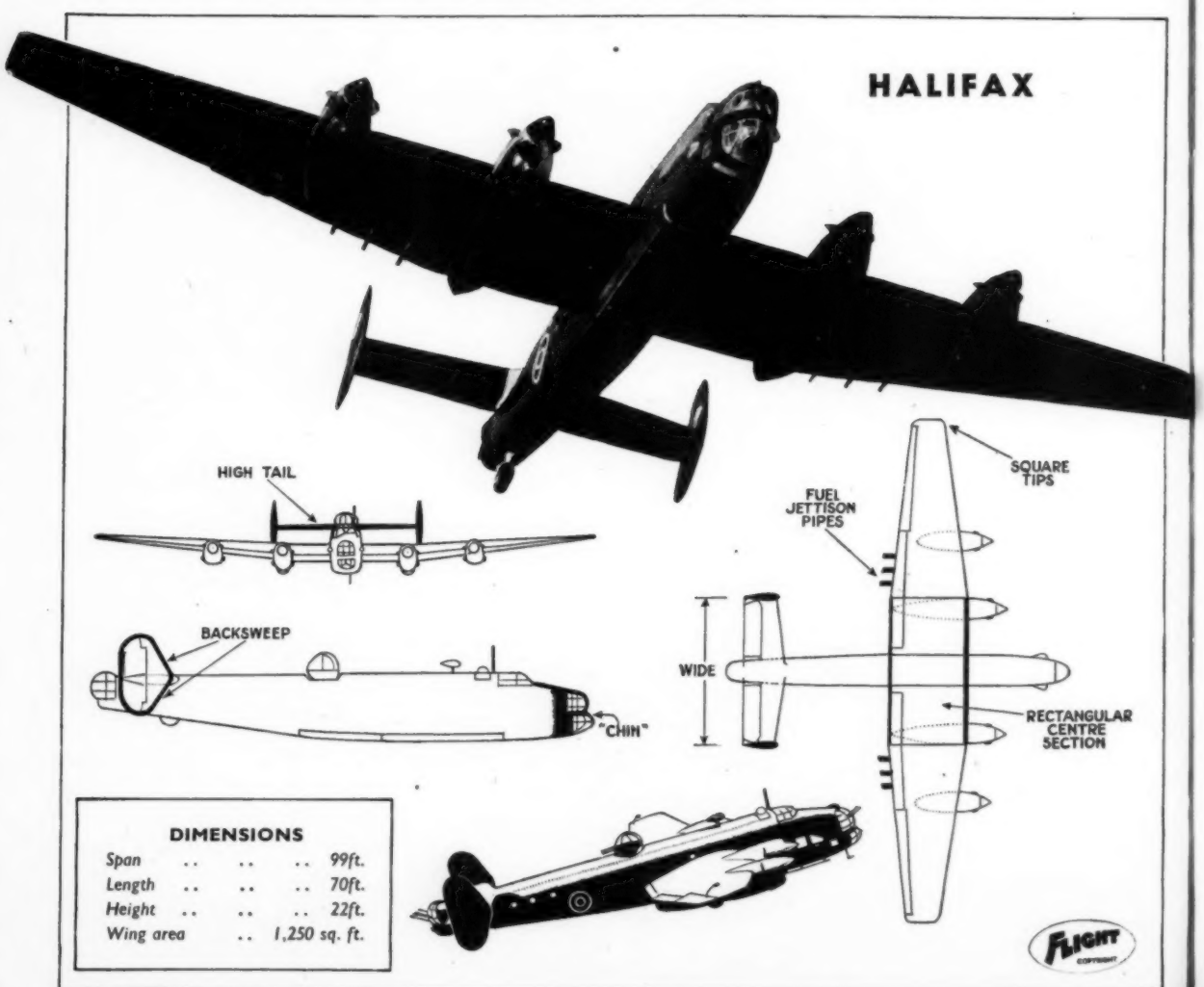
It is rather in the nature of just compensation, therefore, that Handley Page should provide, during this war, another four-engined bomber which is every bit as modern as were those old biplanes of more than 20 years ago, with the difference that, this time, they are getting plenty of chances to hit the Hun where it hurts him most, namely, in his own country. The Halifax is proving itself to be one of our most successful long-range bombers, having a maximum bomb load of 5½ tons, a maximum range of about 3,000 miles, and a top speed of approximately 300 m.p.h. These maximum figures, of course, are not all obtained simultaneously.

Of the mid-wing type, with twin fins and rudders, the Halifax is of all-metal construction with smooth, stressed-skin covering except for the control surfaces which are fabric covered. The fuselage, which is "slab-sided" in section, is of sufficient depth to enable the crew to move about in an upright position, but in spite of its comparative roominess it gives no impression of clumsy bulk, thanks to its well-proportioned lines. Incidentally, the fuselage is constructed in jig-built sections which is the usual Handley Page practice and which greatly facilitates rapid production.

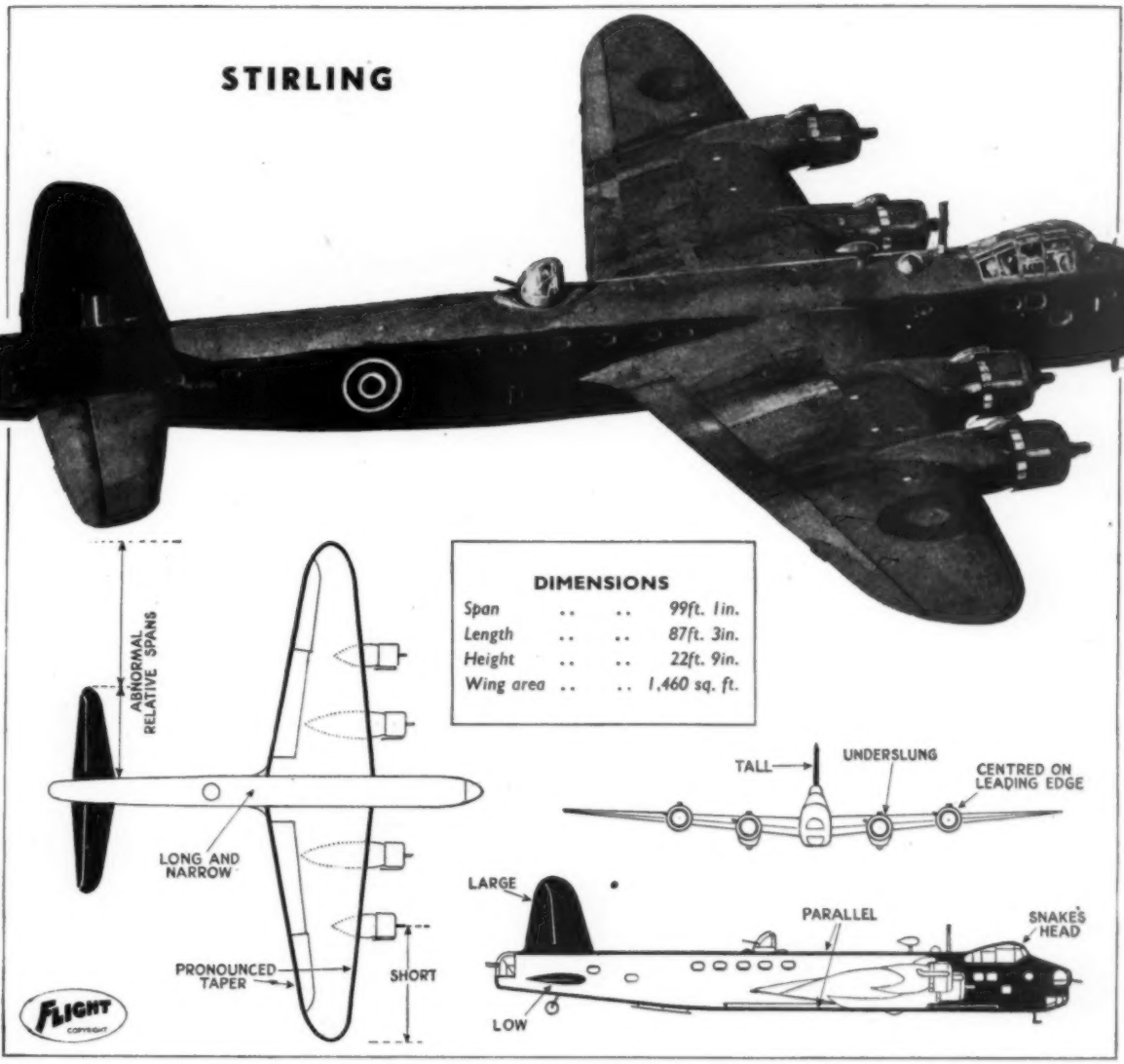
Power is supplied by four Rolls-Royce Merlin XX liquid-cooled, V-shaped 12-cylinder engines, each giving 1,175 h.p. at 20,500ft., and fitted with Rotol three-bladed fully feathering c.s. airscrews. Fiame-damping ejector exhausts are employed.

The armament of the Halifax comprises two Boulton-Paul electrically operated two-gun turrets, one in the nose and one amidships above the trailing-edge of the wings, and a four-gun Boulton-Paul turret in the extreme tail of the fuselage.

Fitted with de-icing equipment and with oxygen apparatus for its crew of seven, the Halifax is described by its pilots as easy to fly and very manœuvrable.



HEIR CHARACTERISTICS



THOSE with an eye at all sensitive to beauty have been known to exhibit a certain lack of enthusiasm for the appearance of the Short Stirling. The answer, of course, is that the primary duty of a bomber is to be efficient; i.e., to carry the greatest possible load of unpleasantness to the enemy (eight tons of it in this case) in the shortest possible space of time and with the greatest possible degree of reliability—and that nobody can possibly dislike the look of a Stirling more than do the Germans!

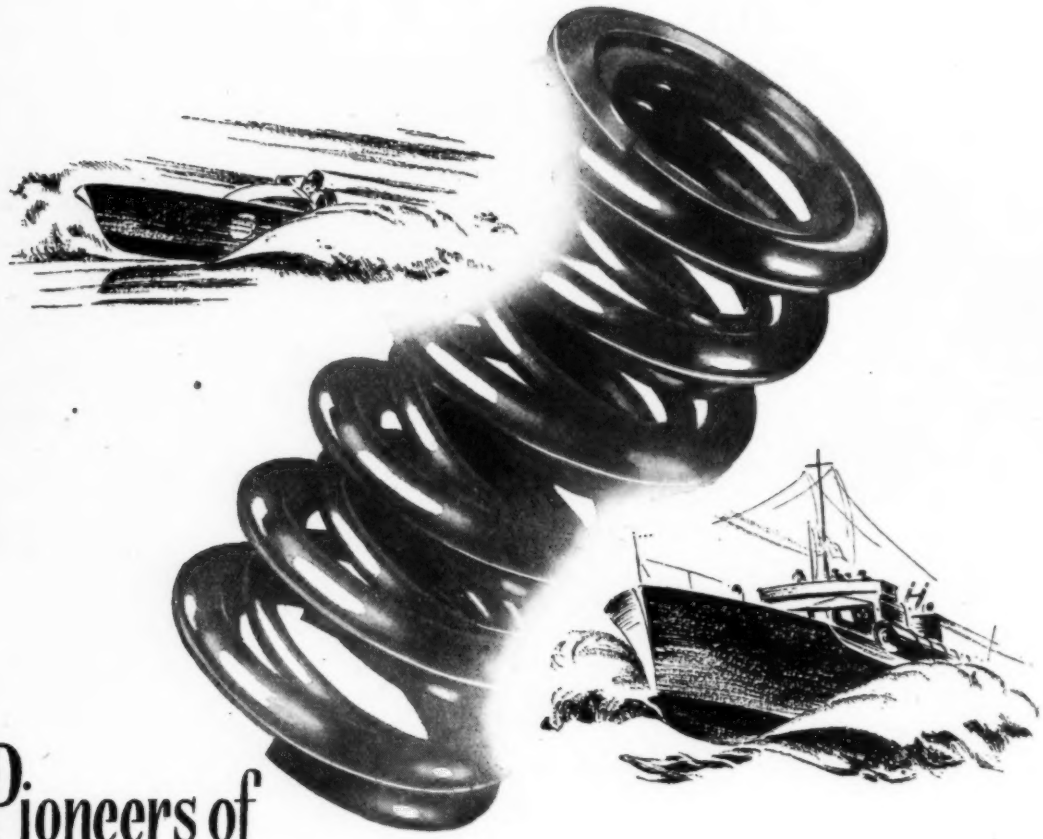
Spotting experts, on the other hand, sum up the R.A.F.'s champion weight-lifter in the terms: "If you see a large four-engined Whitley with a Wellington tail, it's a Stirling."

Structurally, the Stirling bears several important resemblances to its flying-boat forbears; the mid-positioned wings are almost identical, so far as their two-spar type of design is concerned, with those of the Empire and Sunderland boats, and so is the cantilever tailplane and the single fin and rudder. Even the 87ft. long, rectangular fuselage shows a form of construction very similar to that of the boat hulls, though the actual shape is obviously very different.

All-metal construction is employed throughout, the aluminium skin of the fuselage having joggled and flush-riveted joints. Gouge flaps with a chord equal to 48 per cent. of the main wing chord are fitted.

The mid-wing layout of the Stirling necessitated an undercarriage of unusual reach, and since its long "legs" and their bracing members had to be accommodated between the wing spars when retracted, a double-jointed arrangement was unavoidable. This looks more complicated than is really the case, and the fact that the fairing plates are attached at the middle joint (and therefore drop down with the legs from the nacelles) gives a curious appearance reminiscent of the hairsuite legs of a draught horse. But the arrangement functions faultlessly under its enormous load. Another unusual feature is the fitting of twin retractable tail wheels.

Three power-operated gun turrets (nose, dorsal and tail) are provided and mount eight 0.303in. machine-guns in all, four being in the "stinger" turret. Bristol Hercules 14-cyl. sleeve-valve radial engines of 1,600 h.p. or Wright Cyclone double-row GR2600 radials of the same power are fitted, De Havilland c.s. airscrews being employed in either case. Top speed is approximately 300 m.p.h., and the maximum range more t! an 2,000 miles.



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The Inspectorate of the Polish Air Force, which is the largest of all the Allied air forces operating with the R.A.F., has its organisations "in the field" as liaison officers, the staff of the fighter squadrons and Polish senior officers at R.A.F. stations.

Polish airmen do not like their names to be mentioned, because hundreds of them have their families in Poland, where the "cultured" Germans are waiting to avenge themselves upon these helpless persons. The airmen prefer, for that reason, that their individual successes should be credited to the Polish Air Force in general. The number of awards—one D.S.O.; 19 D.F.C.s; 9 D.F.M.s—granted to Polish pilots up to date certify that among them are many men of the first class. And Goering has become aware of this.

We have alluded to the warm welcome that was given to the Polish airmen when they arrived in Britain. To-day that seems natural enough, but at that time the course of the war did not seem to justify this welcome. So we have to look for the reasons. To find them we must remember the atmosphere prevailing at the time of the landing of the Poles. Britain, quite unexpectedly, found herself alone. She was not fully mobilised, not sufficiently armed, and she had to face an enemy who had conquered the greater part of Europe and might attempt an invasion at any moment.

This banner of the Polish Air Force in Great Britain was made during the war by Polish women, smuggled out of Poland and brought to this country.

After Dunkirk

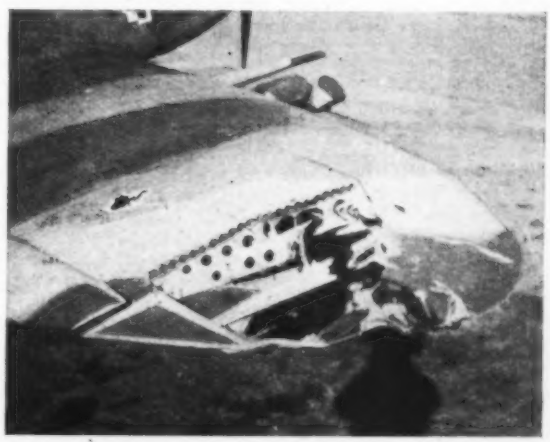
Almost the whole world, certainly Hitler, thought that Germany had already won the war. But the British nation decided to continue, despite all and everything. It was then that Mr. John Citizen suddenly saw thousands of Poles land in this country. While the German attack was expected from day to day, he beheld these officers and men who had not lost heart after the defeat of Poland and of France, but who were eager to fight again at his side. Whilst invasion seemed to be a foregone conclusion, he saw groups of refugees looking for security in this threatened island. All the Poles who could escape rushed to Britain without a moment's hesitation, animated by one thought and one will. In the hour of their severest trial the British suddenly discovered that there was another nation which, like themselves, never doubted Britain's destiny and which unhesitatingly united its fate to theirs.

From these general considerations let us pass to certain individual experiences recorded by a Polish writer, Andrzej Plodowski. "The water had already reached the level of my mouth when I saw Lt. O. leaving the turret. I screamed, they told me, I gulped as much air as possible and I began to go under with my plane. My brain was still working clearly and quickly, I was fully conscious that in a moment I would be dead. Within a few seconds all my life passed before my eyes. My first thought was: 'why didn't I go to the chapel to-day before the take-off, which I always used to do?' Good-bye, my fatherland, and my dear mother. . . ." That is a fragment of a manuscript which came into the hands of Plodowski. It describes a forced descent on the sea of a Polish Wellington crew, returning from a night raid over Germany. The Polish bomber, seriously damaged by German *flak*, was unable to reach the English coast. The pilot decided to come down in the rough sea of the Channel in the hope of saving the lives of the crew, and this he accomplished, for all six of them were rescued and safely landed.

A pity Goering was not present at the operational breakfast on a recent Friday morning when Leopold, a 22-year-old Pole, was given the title of Obywatel Honorowy Miasta Bremen. He had just returned with the Pilsudski squadron from the R.A.F.'s four-figure attack, and because he had visited the German port for the third time he was entitled, by virtue of the custom of the Polish Air Force, to the rank of Freeman of the City.

Many Poles are now "Freemen" of several German towns. One middle-aged Polish navigator who was over Bremen estimates that he has dropped 60,000 lb. of bombs on Germany, and his only regret is that he has not seen the work they did. It would have been some return, he thinks, for Warsaw and Cracow. Many of these Poles have seen the New Order in being, have seen notices signed by von Brauchitsch and headed "Achtung" ("Take Notice"), and have disregarded them. The Squadron Interpreter is a little hard of hearing because he was beaten about the head with the butt end of a rifle while in prison.

Most of the customs and codes of these bomber crews have their British counterparts, the reason being that when they came to England they had to start training, although most of them were experienced members of the Polish Air Force. "We were accustomed to the air," said one of them, "but we could only map-read." They knew nothing of navigation over the sea, so they trained and picked up the ways of the R.A.F. Their words of



In spite of its clipped wing this Spitfire was brought home safely by its Polish pilot.

POLISH SQUADRONS IN THE R.A.F.

command, however, their discipline and their drill are all Polish. They salute in a manner half-way between the R.A.F. and the Navy. Polish ranks are shown by the stars on their lapels and British ranks by rings on their sleeves. The men who fly wear metal eagles.

We may tell of what happened on a flight a few weeks ago, when early one morning a Wellington, flown by a Polish crew, was returning from a large-scale raid on Germany. She was forced down into the sea, and the first intimation that something was wrong was the receipt in this country of an S.O.S. which arrived at 5 minutes to 4 a.m. At 12 minutes past 4 a second message was received: "Reeling in aerial to land." Both messages provided first-class fixes, and so established the position of the aircraft accurately.

The Air/Sea Rescue Organisation was brought into play, and at 4.33 a Hudson was airborne on the first air/sea rescue patrol. At 5.23 the Hudson crew saw a Junkers 88, and the captain, fully alive to the fact that his primary task was to find the air crew in distress, took evasive action. On went the search and only five minutes later a Very signal, fired no more than two miles astern of the searching aircraft, was seen by the rear gunner. The Hudson turned sharply and hurried back on its own track.

What are the wild waves saying? A Polish sergeant giving instruction in the operation of a short-wave wireless set, placed on the tail of a Hurricane.

Spotted by a Hudson

While this manœuvre was in progress another signal was seen. The pilot flew straight over it and at 5.33 a dinghy was spotted. The Hudson dropped a flare to fix the dinghy's position, after which the aircraft climbed to send a message to base, and at 2,000 feet, in the half light, the crew lost sight of the dinghy. So the pilot came down to less than 500 feet and once more started to search the sea. It was twelve minutes past six when the Wellington, floating with the tailplane above water and the rest of the aircraft awash, was spotted.

Using the wreck as a starting point, the Hudson then set course down wind, and in less than a minute the dinghy was found. The Hudson crew was not quite certain how many men were in it, but they thought they could see at least five or six. Four of them stood up and waved excitedly. To cheer them up the Hudson dropped another dinghy, food, water and cigarettes, and then settled down to circle the distressed aircrew. Very soon the captain of the Hudson got a message from base to say that other aircraft had been sent off to relieve him, and that they would arrive about 7.15.

The relief Hudsons reached the spot six minutes before the stated time. At seven minutes to eight the crew of one of the two Hudsons which had taken up watch on the dinghy made contact with two naval vessels which had been sent to the spot. The Hudson signalled to one of them by Aldis lamp and guided it to the dinghy. When the Wellington crew was taken aboard the naval vessel it was exactly one minute to eight. A model rescue.

The Birth of a Banner

Let us now look back to the winter of 1939-1940, when hundreds of Polish airmen were impatiently waiting at Lyons for the opportunity to renew the fight. The depressing atmosphere of being on a kind of military dole was accentuated by memories of the September defeat. Then it was that a flight lieutenant had the idea to create a flag for the Polish Air Force which would be a symbol of the indomitable wish to fight and would bring the blessing of victory. So he wrote to the women of his home town, asking them to make the flag, and sending them the design to be embroidered; it was to include the national motto: "God, Honour and Country"; and under the picture of St. Theresa, who is specially venerated in Poland, the motto: "Love calls for Sacrifice."

In spite of the Gestapo and other obstacles the women did not fail; the flag was consecrated and arrived in Belgium; it was too late to bring it to France; but, having been carried over to England, it was presented to the Polish Air Force by the Commander-in-Chief and Prime Minister, General Sikorski. "You served your country gallantly," he said "while she was still free. You are serving her as well to-day, wing to wing with our Allied Royal Air Force. . . . You are spreading the fame of the Polish airman throughout the world. It has already become synonymous with courage, lightning judgment, loyalty and chivalry. During the most critical stage you set the example of unwavering faith in final victory and sealed it many a time with your own blood."

Three Examples

In conclusion, to illustrate the work and feelings of the Polish Air Force in Britain, we will repeat three impressions given by members of the crew of a bomber, by a fighter pilot, and by a technician of the ground personnel. All three are authentic and are taken from the log-books of their respective units:

Bombing Expedition over Berlin: "We are going to Berlin and so are more than usually excited. The bombardment of the German capital has a special thrill for us, not because of its better defence nor the longer distance and the greater danger of such a flight, but the immediacy and directness of our revenge for the bombardment of Warsaw and other Polish cities . . . Loaded to the limit, we start at dusk. The planes soar heavily from the tarmac, but once in the air they quickly gain height.

"Night is very dark, but weather is good . . . Minutes pass in silence and drip slowly hour after hour . . . Enemy's searchlights begin their work, the A.A. artillery adorns in our honour the darkness with thousands of fireworks . . . We hear some shell fragments on our wings. We are approaching our target, the eye is on the sight.

POLISH SQUADRONS IN THE R.A.F.

'Slightly to the left, steady' : . . One second, two, three, four. . . . 'Attention . . . bombs.' The machine seemed to sigh with relief when some thousands of pounds of explosives went down. One big and six smaller explosions lighted up the darkness. For a fraction of a second we saw streets, crashing houses and collapsing factory chimneys, flames leaping high and fires spreading. Our successors will have an easier task. We turn for home."

A Fighter in Defence of London: "At 1.30 a.m. our squadron was flying south of London, 20,000ft. above the ground, when we received a wireless message giving the course of an enemy's bomber expedition. Almost at the same moment I sighted about 30 Dornier Do.215s flying at the same level as ourselves, and 2,000ft. above them the same number of Me109s. Our squadron attacked the formation of bombers from the rear at a distance of 300 yards. We opened fire.

"Then There Was One"

"After our second attack two bombers broke away from the main formation and were quickly losing height with smoke pouring from their tails. One of them crashed into the sea, the other vanished in the clouds. We were still flying in the southern direction. Not far from the French coast I saw one Do.215 flying slowly. I thought that this was probably the one which had succeeded in hiding among the clouds. I attacked it twice from 100 yards without success.

"At the same moment I saw over the Do.215 two other planes, and, believing them to be British, I joined them to attack the German bomber simultaneously. But these two planes turned out to be German fighters escorting the crippled Do.215. Without further delay I decided to attack the nearest fighter, and did so from a distance of 40 yards. The Me.109 caught fire immediately and crashed into the sea. I aimed the red cross of my sight on the second fighter and sent him down after the first. For the third time I attacked the bomber, but again without success. We were over France, but I resolved to attack for the last time from very near; I had only a few bullets left. At last the Dornier crashed and caught fire."

Spirit of the Ground Crews

From a Member of the Ground Personnel: "I am writing these few words to tell how we feel about our work and the work of our squadron. We have plenty to do and we like it. We work with great pleasure because our pilots are soundly thrashing the Germans. The results are excellent, though the machines often come back with so many bullet holes that it is difficult to understanod how the pilots escaped death. Surely God's protection keeps them. Our brave pilot F., for example, came home without flaps and nearly the entire tail missing. The whole machine was pierced with bullets. The next day he had to fly again. So we technicians tried to repair the machine, and worked the whole day and night so that the plane was ready in time. We know and love our work. We are preparing each plane, so that it should not let down the pilot while in action. . . . I am closing now, although I could write much more, but this work of ours is waiting, and no second should be wasted."

There is now published over here a technical monthly review for the Polish airmen entitled "Mysl Lotnicza," which means "The Thought of the Air Force." The latest number contains a series of very interesting articles: "The Polish Air Force—To-day and To-morrow"; "The Air Force Ideal of the Slavs"; "The Possibilities of Soviet Industry," and several other purely technical articles.

A more popular publication is the fortnightly organ of the Polish Air Force, whose name, "Skrzydla," signifies "Wings," for it contains humorous articles, drawings and even articles, sometimes two or three in a single number, in English.

To England via Marseilles and Narvik

In the course of an article entitled "A People in Exile," H. I. Nelson says that these Polish airmen are not anxious to talk about their experiences. Yet nearly every one of them has been through things that—a few years ago—we in England would never have dreamed of finding outside the pages of fiction. "Let me tell," he writes, "of one Polish airman—still a boy. Serving originally in the Polish Navy, he was severely wounded in the face in the first devastating onslaught.

"Picked up on the beach by a Polish nurse, he was brought back to health. With a few comrades he made his way slowly across south-east Europe to the coast. Sometimes friendly peasants helped them. Sometimes they went on foot, milking cows in the fields at night to get food; sometimes they stole lifts on freight trains. Eventually they reached Marseilles to join the French Navy. Then Narvik, where they were torpedoed, after which they were rescued by a British destroyer. And so to England and the Polish Air Force. Small wonder that they come here resolute, toughened by hardship, with a quiet determination to take it out some day on the enemy who has made them suffer. The sacrifice of their own lives is what they least dread. They have been too familiar with sudden death to fear it very much. Referring to the British way of announcing losses: '*x* of our aircraft are missing but the pilots of *y* are safe,' they would prefer to say '*x* of our pilots are missing but *y* of our aircraft are safe.' The machines which destroy the enemy are the important thing; there will always be men ready to take the places of those who are dead."

In "the Drink"!

An anonymous Polish pilot was making his official report. He was a sergeant-pilot who had been escorting a bombing expedition over Lille. During a fight on the way back his engine was hit, it started smoking and knocking, and as he passed over the French coast east of Calais German anti-aircraft opened fire on him with disconcerting accuracy: "At 3,000ft. I opened the cockpit door, undid the belts and tried to get out of the plane, but the air pressure was too strong. I was losing height rapidly, and, seeing no other possibilities, I decided to descend to water level, my altitude being insufficient for baling out. Reaching the water, I first touched the surface with the tail and then with the whole plane. A bad shock was the result. The plane sank straightaway. Down under the water, I immediately began to disentangle myself from the plane. No easy thing to do. At last I got clear. I began to swim upwards, although my parachute was still fastened to me. I reached the surface and took a few breaths. Again I was dragged under."

He then, under the water, managed to undo his parachute and unscrew the lid of the compressed-air bottle, so that the dinghy, filling gradually with the gas, rose to the surface, and, when he had summoned up a little strength, he climbed into it. During four days he had to remain in the Channel, for none of the planes passing overhead spotted him. At last three Spitfires and a Lysander approached. The Lysander dropped a flare close to him and flew off again. The Spitfires, however, continued to circle above him. "After about twenty minutes a lifeboat came up. Thus was I saved. I was lucky."

IN PARLIAMENT

A Question of Command : Payment for Airports : Courses for A.T.C. Officers : Church Parades Voluntary

Combined Training

Maj. Taylor asked the Prime Minister whether he is satisfied with the present arrangements for Army and Air Force combined training and action in this country; and whether any modifications to present arrangements are receiving active consideration.

Mr. Attlee: The joint training of the Royal Air Force and the Army is proceeding satisfactorily on the lines indicated in the reply which my right hon. Friend the Prime Minister gave to a similar question by my hon. and gallant Friend on July 7th. The methods and scope of the training are constantly being studied with a view to improvement.

Maj. Taylor asked the Prime Minister whether the officer commanding Army Co-operation Command is an Army or a Royal Air Force officer; and whether the officer commanding the Fleet Air Arm is a naval or a Royal Air Force officer.

Mr. Attlee: The Army Co-operation Command is a Command of the Royal Air Force. Its Commander-in-Chief is an air marshal. The Senior Air Staff Officer is a brigadier, and the staff of the Command includes both Army and Royal Air Force personnel. The Fleet Air Arm is not a separate Service or command, but an integral part of the Royal Navy. The Fleet Air Arm units are controlled by the various naval commanders-in-chief and flag officers at home and abroad, in the same manner as other units of the Navy.

Maj. Taylor: Does not the right hon. Gentleman agree that it would be better now for the Army to have complete control of Army Co-operation Commands and that Army Co-operation Commands should be commanded by Army officers in Army uniform responsible to the War Office?

Mr. Attlee: That is another question. Perhaps the hon. and gallant Gentleman will put it down.

Mr. Austin Hopkinson: Is it not a fact that the two questions are completely different and that what may be perfectly right for the Fleet Air Arm in respect to the Navy is not necessarily right for the Army?

Mr. Attlee: The hon. Gentleman is quite right.

Civil Aerodromes

Mr. John Dugdale asked the Secretary of State for Air the basis of payment made by the Air Ministry for the use of civil airdromes during wartime; and by whom the ground maintenance staff at such airdromes is paid.

The Secretary of State for Air (Sir Archibald Sinclair): The basis of payment for the use of civil airdromes depends on whether the airdrome is leased under a pre-war agreement or has been requisitioned, or is merely used for casual landings. In the first case, the payment for user and the method of remunerating the ground staff are laid down in the lease; in the second, the owner is compensated under the Compensation (Defence) Act, 1939, and the ground staff are paid directly by the Air Ministry or by the operating company; and in the third, casual landings are paid for by agreement or at standard rates prescribed in the airdrome licence, remuneration of the ground staff being the concern of the owner.

Mr. Dugdale: Is not payment in the first place made on the basis of flying time, and is not that an encouragement to people to make unnecessary flights, in order to get more payments?

Sir A. Sinclair: In the first place, payment is made under the terms of the leases. No leases have been entered into during the war; we now proceed by requisitioning.

Mr. Dugdale: Is there no possibility of altering the terms of the leases in cases where they involve flying time?

Sir A. Sinclair: Alterations in the terms of the leases can be made only, of course, by agreement between the parties.

Confidential Reports

Wing Cdr. Hulbert asked the Secretary of State for Air whether he will revert to the peacetime procedure whereby all annual confidential reports are initialled by the officer reported upon whether adverse or favourable.

Sir A. Sinclair: No. Sir. The wartime practice of showing officers their confidential reports only when they contain adverse comment has advantages over the peacetime practice and is in line with that adopted in the Army and in the Royal Navy.

Wing Cdr. Hulbert: Does my right hon. Friend not think it would give great encouragement to junior officers if they could see the reports?

Sir A. Sinclair: The public interest, and the interest of the Service, make it necessary that these reports should contain candid and realistic assessments of the officers' character and abilities, and this is best served by the present system.

Maj. Gen. Sir Alfred Knox: Are adverse reports always shown to the officer concerned?

Sir A. Sinclair: Yes, Sir.

Air Training Corps

Wing Cdr. Hulbert asked the Secretary of State for Air whether he can make any statement on the recent reorganisation of the Air Training Corps, and whether any further changes are contemplated.

Sir A. Sinclair: In order to simplify organisation and accelerate administration, the work hitherto done by the headquarters of the Corps has been transferred to the Air Ministry; and the Air Ministry now deals directly with the regional commandants and with the Commandant for Scotland. A post of Inspector of the Air Training Corps has been created, under the Air Member for Training, and is filled by the former Commandant. The post of Commandant lapses. The changes were introduced on July 13th. No further changes of a major character are in contemplation.

Wing Cdr. Hulbert asked the Secretary of State for Air what arrangements are made for newly commissioned Air Training Corps officers without previous service experience to acquire administrative and disciplinary knowledge, either by attending short courses at Royal Air Force stations or otherwise.

Sir A. Sinclair: Officers appointed for duty with the Air Training Corps are encouraged to take short courses of instruction at R.A.F. units. Officers attending courses receive the pay of their substantive rank, and are provided with accommodation and rations, or are given allowances instead.

Wing Cdr. Hulbert: Is my right hon. Friend aware that my noble Friend the Commandant for Scotland of the A.T.C. has organised local courses for officers, which have proved very successful. Will the same thing be done here?

Sir A. Sinclair: Yes, Sir; it is a very good plan, and I am considering the possibility of extending it.

Mr. Sorensen asked the Secretary of State for Air whether he is aware that instructions have been issued to certain Air Training Corps, London squadrons, that no church parades or instruction meetings are to be held on Sunday mornings in order that youths may be able to attend a place of worship with their parents; that the church attendance of youths with or without parents is confined to a small minority; whether the explanation accompanying the instruction is to be interpreted as an implicit order; whether he will make it clear that church parade or church attendance is entirely optional, not to be taken as part of the Air Training Corps course of training, and no disability or penalty will be suffered by non-attendance?

Sir A. Sinclair: Instructions were issued to all units of the Air Training Corps that from May to September inclusive two Sunday mornings a month should be kept free of normal A.T.C. parades. The purpose of the instructions is to enable cadets to worship with their families if they wish to do so. There is no obligation upon A.T.C. units to hold religious services or on cadets to attend them; nor is there any penalty for non-attendance. This should be clear to all concerned, but if any misunderstanding has arisen and my hon. Friend will give me particulars of the instance, I will consider whether any further instruction is necessary.

When R.A.F. Officers Retire

Wing Cdr. Hulbert asked the Secretary of State for Air whether Royal Air Force Officers, compulsorily retired on the sole ground of age, receive 42 days' leave on full pay and allowances the same as Army officers.

Sir A. Sinclair: During the war the employment of officers is not being terminated solely on grounds of age, but only when they are unsuitable for further employment or when no further employment is available for them. The question whether there should be any increase in the amount of leave with full pay which is granted to officers whose employment is being terminated is at present under consideration.

Balloon Barrage Lorries

Mr. Parker asked the Secretary of State for Air whether lorries immobilised at fixed balloon barrage sites where the winches are driven by separate prime movers can be released for other work.

Sir A. Sinclair: Yes, Sir. These vehicles are being put to other uses.

PREVENTION of ROCKET MOTOR BURN-OUT

The Advantages of Concentric Feed in Liquid-fuel Rocket Propulsion

By CEDRIC GILES, Technical Chairman of the American Rocket Society

THE main obstacle to the success of the liquid-fuel rocket motor (a type of jet propulsion where all the necessary fuel and oxygen is carried along) has been the tendency of the motor to corrode and burn out. With the burning combustibles at times reaching to a temperature of 3,000 deg. C., none of the usual methods of counteracting motor burnout has been entirely satisfactory, and even with most of the difficulties involving them eliminated, motors still burn out at frequent intervals. In most types of internal-combustion engines intermittent firing takes place, and high temperatures are reached only for a very short time. Because of this, the problem of sustaining these high temperatures is less difficult, while in a rocket motor with continuous combustion the case is somewhat different.

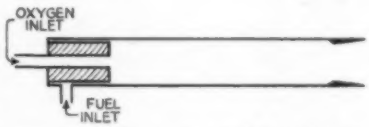


Diagram of a concentric feed reaction motor. The object is to surround the oxygen with fuel.

The best materials for motors would have physical properties of a high melting point, good thermal conductivity, high tensile strength and good corrosion resistance. Where in the past brass and aluminium have been used almost exclusively, it is reasonable to believe that the substitution of monel, duralumin or a similar metal for parts of the motor tending to burn out would be to better advantage. It is also possible that a future alloy or plastic may have enough of these properties to become an ideal combustion-chamber material.

Various types of cooling systems, although written and spoken of highly, usually bring into the picture so many construction complications that they partially defeat the purpose for which designed. Many methods are used to protect and cool the chamber walls—from the addition of water to the fuel to dampen the combustion temperature to external water cooling or regenerative systems where one or both of the propellants are circulated through a motor jacket to assist in cooling the motor and preheating the propellant.

Cause of Burning

The use of refractories for lining the inner wall of the chamber has often been considered favourably in view of the fact that they generally have higher melting points than most metals. But, owing to their poor conductivity of heat, low tensile strength at high temperatures, and difficulty of application, many of these heat-resisting materials lose their effectiveness in usage.

Although each of these methods may be employed individually, or together, they still do not cover all essentials to the problem adequately, and two additional less well-known methods for reducing motor burnout will be discussed at length.

The usual cause of the burning of the chamber walls within the motor is due to the action of the liquid oxygen. Once the walls of the combustion chamber become heated from the high temperature, the nearly pure oxygen striking the walls consume them as a fuel. If the greater part of the oxygen can be kept away from the walls, the walls may be allowed to reach a higher temperature than otherwise. As the burnout points are usually at the feed inlets and the choke of the nozzle, both of these points would need to be better protected than the axial chamber walls.

Probably the simplest as well as the most practical way of preventing motor burnout is by surrounding the liquid oxygen with a thin layer of fuel. With "concentric feed" the oxygen is injected into the motor encircled by a dynamic ring of fuel which protects the walls of the motor from the scoring action of the oxidiser, and introduces a gradient of lower temperature. The insulating area of fuel protects the walls until the greater part of the oxygen is well mixed with the fuel and is on its way to complete combustion.

By having the inlets in the head of the motor, the liquids are set in motion effusing in a straight line towards the motor mouth while being homogeneously mixed. Another important factor is the reduction or elimination of the need for regenerative systems. The absence of such systems results in a lowering of the motor weight, and also leads to simpler motor construction.

Motor units having full concentric feed should be able to use alcohol and liquid oxygen or propellants of lower combustion temperatures without resorting to cooling systems. When using petrol and oxygen or higher temperature combustibles, probably some form of motor cooling will be necessary. Owing to the time lag in the complete mixing of the components, the motor will be of greater length than usual. As diameters of full concentric feed motor are increased lengths will vary accordingly.

One of the main reasons for doubting the feasibility of concentric feed when first introduced was the belief that the exploding gases in the combustion chamber needed to push directly against the solid back inner wall of the chamber. Reaction motors concentrically fed, as well as jet propulsors using external combustion, have shown that propagated explosion waves will deliver a reaction thrust even when travelling a short distance back against the emanating stream of efflux gases.

Apparently the first successful liquid fuel rocket motors employing concentric feed were the ones designed and built by Mr. Nathan Carver in 1936 for the Greenwood Lake (N.Y.) stamp planes. Although the planes, for one reason or another, nose-dived and broke wings, the motor fired perfectly, driving the planes along the ice over the state line. Since then the majority of successful reactors have used some type of concentric feed in their construction. A modified form of concentric feed is being used in the present Wyld motor which was tested by the American Rocket Society during the past summer. In this motor the oxidising agent is injected from the centre of the motor head through a ring of small pinholes, while the fuel is induced through radial inlet openings, where it intersects and encompasses the oxidiser.

Outside Burning

A second method of defeating motor burnout may be accomplished by making use of the principle of "outside burning." In an article published in the American Rocket Society publication *Astronautics*, for April, 1940, the writer described the theory of external motor combustion. In general, outside burning is a method of protecting the rocket motor walls from the oxidising action of the hot gases, by placing the peak flame temperature area outside of the motor mouth.

The ultimate efficiency is attained when the flame placement is such that the greatest possible reaction is obtained with the least possible oxidisation of the motor metal. If the metal melting point of the combustion is inside or too near the motor mouth a burning of the metal will take place. While if too great a distance from the motor the result will be a lowering of the reaction thrust available for propulsion.

The area of highest temperature may be changed at will by varying the ratio of propellants or adjusting the pro-

PREVENTION OF ROCKET MOTOR BURN OUT

pellant feed pressures, through the use of sets of regulating valves.

An interesting analogy to outside burning may be performed by placing a finger in a stream of water a short distance from a faucet. When the spigot is regulated to deliver a flow of less than $\frac{1}{8}$ inch in diameter, a series of waves will travel upward from the obstruction to the spout. Letting the faucet represent the motor, the flow of water the efflux gases, and the finger the centre of combustion, the shock waves in the water stream will be analogous to the pressure reaction waves flowing back to the motor in outside combustion.

From a study of the June 1941 ground test of the Piecewitz-Carver nozzle-less motor, many essentials of outside combustion become clarified. Although during this test the outside burning principle was much overemphasised a recoil of 26 lb. was recorded. All combustion was completed outside the motor, with a sort of "glorified blow-torch" effect, due to an unbalanced ratio of propellants, especially a lack of oxygen.

With a better regulated proportional feed mixture, the area of outside burning would be more limited, more burning would take place within the motor, and a greater reaction would be obtained. This motor test is believed to be one of the few where instead of heating up, the motor acquired a coat of frost during the firing.

By using concentric feed and employing outside burning whenever deemed necessary, the writer believes the principal impediment to successful rocket motors can be overcome. With the problem of motor burnout once solved, the solution to the remaining problems should be found without too much difficulty.

Aircraft 1914-1918

THE HARBOROUGH PUBLISHING CO., LTD., has had the happy idea of issuing a series of sheets of three-view general arrangement drawings of aircraft in service during the 1914-18 period. With the interest in flying so widespread among the general public, there must be many who would like to know what the machines used in World War I looked like, and many young men are in the R.A.F. to-day whose fathers flew the corresponding types in about 1917 or 1918.

The drawings give a fair amount of detail, including three sections through the fuselage and one showing the wing sections used. One advantage is that all are drawn to a uniform scale of 6ft. to the inch, so that relative sizes are immediately appreciated. The smaller types are drawn on sheets measuring 7in. by 9½in., but, for the larger, double sheets are necessary in order to maintain the uniform scale.

We have received drawings of some fifty types, including British, German, and French, but we are informed that the intention is ultimately to bring the number up to about 100. Prices are as follows: Single plans, 6d.; three plans, 1s.; six plans, 1s. 9d.; twelve plans, 3s. The plans are obtainable from the Harborough Publishing Co., Ltd., Allen House, Newarke Street, Leicester.

To Prevent Waist?

A WARTIME Prices and Trade Board order cutting by 30 per cent. the tonnage of corset steel for use in Canada is going to make 60 tons of highly finished steel available for war purposes, according to a recent statement by H. H. Foreman, administrator of fabricated steel.

The reduction applies to 1942 production and is based on the 1941 output. The metal used for corsets is one of the most highly finished steels and is required for springs in aircraft engines and other war purposes.

R.A.F.'s Training Facilities in U.S.

JUST over a year ago, when there was a great need of increased training capacity for air crews, the United States Government offered to fill the gap whilst further training facilities were being developed throughout the Dominions by placing training capacity in the United States at the disposal of the R.A.F. This offer was gratefully accepted.

Since this scheme was inaugurated the United States Air Forces have, however, made such rapid strides in their own training expansion that they are now in a position to man large numbers of aircraft previously allotted to the R.A.F. and, as training capacity within the British Commonwealth has been rapidly and successfully developed, it has now been found possible to relinquish United States training capacity allotted to the R.A.F. United States Air Force cadets will accordingly eventually take the place of Royal Air Force trainees in the south-east training centre where training is in progress.

British flying training schools in the United States which are operated under contract with civil companies so far remain unaffected with the exception of two, which will eventually be taken over by the United States Air Forces. The scheme has been a great success, not only on account of the large number of pilots trained, but also because it led to close co-operation between personnel of the United States Air Forces and the R.A.F.

In addition to the marked success of the scheme from the training aspect, the kindliness and hospitality shown by American families to so many young men who came among them straight from England has been immensely appreciated and, it is safe to say, will never be forgotten.

Passable Essay

AT a Fighter Command station in the North-East an aircraftman was tested by the education officer as a candidate for air crew, and among things he was asked to write was "a twelve-line summary of the political situation in India."

The aircraftman duly handed in his paper, and the education officer was overwhelmed to read a compact little essay, which would have done credit to a newspaper leader-writer.

He expressed his praise and remarked, "You seem to have some literary talent."

Whereupon the aircraftman murmured respectfully, "Yes, sir; I was managing editor of a chain of newspapers before I entered the Service."

TRAINING THE WESTERN HEMISPHERE: This flight of Stearman primary trainers indicates by its markings that in addition to the United States, this type is being used by the Brazilian air force, the Cuban army air corps and the Venezuelan army. The Maple Leaf could now be added, as the type has been adopted by Canada. The original American machine was designed for work in temperate climates, and it is to be assumed that for use in Canada there will be cockpit hoods, blind-flying instruments, night-flying equipment, and Sutton harness.

WRENS of the FLEET AIR ARM

MAINTENANCE and servicing of the Navy's aircraft and their armament and equipment are now being done by the sailorgirls of the Women's Royal Naval Service, whose duties range from (below) "Weather" to (right) "Whiteheads."

(Below) Doing a few odd jobs to an Albacore, apparently for the special benefit of the photographer.

Below, on the right, the wiring and the exhaust ring of a Swordfish are receiving attention.

(Above) : Even acetylene welding is not beyond the capabilities of the Navy's Jill-of-all-trades.

Correspondence

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

METAL CONSTRUCTION 20 YEARS AGO

Men Behind the Short "Silver Streak"

IN order to correct a wrong inference which might be drawn from your article on the above, I wish to point out that during the whole of the time this machine was being designed and built Mr. Lipscomb was not in Rochester and thus could not have assisted in the matter.

The design was carried out by Mr. F. Webber under Major D. T. Gnosspelius who was then Mr. Short's chief engineer, the writer being responsible for all stressing and aerodynamic calculations. C. F. HODSON.

Veteran Apprentice on the "Silver Streak"

WITH reference to your article in the July 16th issue of *Flight* on the Short "Silver Streak," when I was apprenticed to this firm I worked on the machine. The propeller was a light alloy casting hollowed out, leaving a series of honeycomb stiffeners and backed with a sheet of duralumin.

It was found that the dural covering for the wings caused a bad reflection in flight and the tool room rigged an arrangement of electric drill and Bowden-type flexible cable with a wire brush on the free end; this brush was used to scratch the surface of the skin, producing a matt finish.

While on the subject of Short Bros., J. Lankester Parker was test pilot, and has been with them ever since. I was an apprentice of 17 years of age, and we looked upon him as an old man, but I have since ascertained that he was four or five years older than I—the "old man's age being 21-22!

Just for curiosity, I would welcome information as to whether I could regard myself as a veteran aircraft apprentice. My indentures were issued when I was 15, in the year 1916, and I should imagine that not many boys were apprenticed as "aeroplane erector and mechanic" before this date.

I am still employed in the industry (on estimating).

H. E. HARDWICK.

A Stressed-skin Model Flew In 1913

I HAVE read with interest your article—"Metal Construction of Twenty Years Ago"—in the July 16th, 1942, issue of *Flight*, in which you mention that stressed skin metal construction was first introduced in tangible form at the Aero Show of 1920.

I would suggest that an earlier conception of stressed skin metal construction in tangible form, comprising a scale flying model airplane, was exhibited by Mr. Charles Desoutter at the 1913 Aero Show at Olympia, and was illustrated and described in *Flight* in March, 1913.

It had a wing span of approximately 10 feet and was powered by an engine driven by compressed CO_2. The whole of the fuselage was built of magnesium alloy sheet with transverse formers, but no stringers.

The model was awarded first prize for design by the Royal Aero Club, and was, I believe, the subject matter of a number of provisional patents. Shortly after this it was flown at an exhibition at Hendon and was eventually acquired by the late Lord Edward Grosvenor. When I last heard of it, it was exhibited at premises occupied by the Inventions Board, situated, I believe, in Trafalgar Square.

About this period, Mr. Desoutter's brother was unfortunate in losing a leg as a result of a crash in a Bleriot monoplane, and, seeing his brother struggling about with the heavy wooden leg of those days, Mr. Desoutter conceived the idea of applying the principle of stressed skin construction to artificial limbs. The results were such that the whole of his time for many years was diverted to the making of metal artificial limbs which resulted in revolutionising this industry.

It would seem this was, undoubtedly, a loss to the aircraft industry, but, nevertheless, over 40,000 limbless soldiers of the last war have had cause to be thankful.

Later events, however, showed that the aircraft industry did not altogether lose by all this, for the reason that artificial limbs were drilled and flush riveted in precisely the same manner that aircraft are built to-day, and the air motor which Mr. Desoutter had designed as the power unit for his model airplane was developed and became a small pneumatic handdrill for drilling the rivet holes in the legs.

Patents were taken out for this, the first small hand pneumatic drill, and so began another revolution, this time in the portable tool industry.

It woudl be of interest to know if any of your readers have any records of an earlier example of stressed skin metal construction. F. MEW.

FROM A.T.C. TO R.A.F.

Deferred Men on War Work

HAS "Deferred Flight Sergeant, A.T.C.," ever thought that some deferred airmen find it absolutely impossible to attend A.T.C. classes, etc., owing to their war-work? Also, an R.A.F. volunteer of, say, 32 years would feel fine having to do parades with boys of 15 and 16 years!

So please don't try to take another fellow's chance by your own rather peevish insinuations, "Deferred Flight Sergeant," but be satisfied that you are *able* to get the training you *are* getting from the A.T.C. A DEFERRED AIRMAN.

Definite Protection for All Deferred Men

IN the letter published in your issue of July 23rd, under the title of "From A.T.C. to R.A.F.," it is suggested that A.T.C. Deferred Service Personnel should get preference in call up over Deferred Service Personnel who are not in the A.T.C. because they are not preparing themselves for service with the R.A.F.

This is not the fact. After attestation you are given the address of the nearest A.T.C. Squadron and told to get in touch with them. In my area we have a special group for Deferred Service Men. We attend four nights a week and Sunday mornings for instruction in maths., navigation, morse, drill and P.T. If this is not preparing ourselves I do not know what is. Also, of late all such groups as ours have come under the auspices of the A.T.C. under the New Air Ministry Order, and we now have a definite prospectus, as laid down by the Air Ministry, with a view to taking the A.T.C. Proficiency Test, which is a qualifying exam. for I.T.W.

This applies to Deferred Service Men all over the country. If "Deferred Flight Sergeant, A.T.C.," does not know of this I would say that his squadron is a little behind the times.

C. H. POOK, R.A.F.V.R. (Prospective Pilot).

PROPELLORS OR AIRSCREWS

Comparison with Marine Counterpart

IN connection with the correspondence and your editorial comments from time to time on the above, it has frequently been stated by people who ought to know that the propeller operates by screwing into the air and dragging the plane along, but I have frequently wondered whether this is in fact what it does.

I know nothing whatever about aircraft, but I know something about boats, and a boat is propelled by sucking a stream of water ahead of the boat and projecting it out behind. I do not think there can be any possible doubt about this. Anybody who has cruised in narrow, rather shallow waters will find that the water is being drawn down from the banks about amidships, if not forward of it.

Anybody who has been in a boat behind a steamer will realise perfectly well that there is a terrific stream of water projected aft. Now, surely, the same thing happens with a aircraft. I do not know to what extent there is a suction in front of the propeller, but, of course, everybody knows that there is a terrific stream behind. The propeller therefore or airscrew or whatever you like to call it, is in fact a fan, and surely should be designed to fulfil the purpose of a fan, which is to draw in air and project it with the greatest possible efficiency.

There has been a good deal in your journal about jet-propulsion, and it would appear that, other things being equal, the important point is, what is the efficiency of a propeller or airscrew in projecting a stream of air aft, or the turbine and other arrangements inside a jet-propelled aircraft?

In the latter the air is sucked into the aircraft and projected aft, having been duly expanded and made use of the heat generated by the turbine, whatever it may be. If this is the case, propeller would be a much more correct description than airscrew because, whether the propeller is in front of the aircraft or at the back, it is still propelling the aircraft by means of the stream of air projected aft. IGNORAMUS.

Service Aviation

Royal Air Force and Fleet Air Arm News and Announcements

A Northrop N.P.3 of the Royal Norwegian Navy in Iceland. Operations, which consist mostly of anti-submarine patrols, are carried out under Coastal Command.

Promotion

The London Gazette, July 28, 1942.

Air Vice-Marshal T. L. LEIGH-MALLORY, C.B., D.S.O., A.F.C., to be Act. Air-Marshal. July 13, 1942.

Retirement

Grp. Capt. (temp. Air Comdre.) A. L. GREGORY, M.B.E., M.C., is placed on the retired list and retains the rank of Air Comdre. June 13, 1942.

Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

BAR TO THE DISTINGUISHED SERVICE ORDER.

Act. Wing Cdr. J. CUNNINGHAM, D.S.O., D.F.C. (and Bar), A.A.F., No. 604 Sqn.—A brilliant leader and a relentless pilot of matchless skill, Wing Cdr. Cunningham has destroyed at least 16 hostile aircraft, many of them at night, as well as damaging several more. One day recently, Wing Cdr. Cunningham destroyed an enemy aircraft without firing a shot. He achieved his purpose by diving through cloud at great speed, and drove the enemy aircraft down to the ground.

BAR TO THE DISTINGUISHED FLYING CROSS.

Act. Wing Cdr. P. R. R. POWELL, D.F.C.—Wing Cdr. Powell is an excellent leader. His ability and skill have inspired his pilots with confidence and set a high standard of operational efficiency. He has completed many sorties, during which he has destroyed one and probably destroyed a further two enemy aircraft.

F/O. R. C. FUMERTON, D.F.C., R.C.A.F., No. 89 Sqn.—F/O. Fumerton is a most tenacious and skilful pilot. One night in June, 1942, he destroyed two enemy bombers during one flight and repeated this achievement a few nights later. His determination to destroy the enemy is outstanding. Since the beginning of June, 1942, seven enemy aircraft have been destroyed at night by F/O. Fumerton.

Wing Cdr. J. Cunningham, who has received a Bar to his D.S.O. for further successes in night-fighting.

F/O. R. WEST, D.F.C., R.A.F.V.R., No. 249 Sqn.—In April, 1942, this officer displayed great courage and determination as leader of a section which intercepted eight Ju.87s escorted by fighters. In the ensuing engagement, F/O. West destroyed one and probably destroyed another of the enemy's bombers. When returning to base he sighted a Ju.88 and, although he had expended his ammunition, he attacked this aircraft head on and forced it to jettison its bombs.

In June, 1942, F/O. West shot down a Ju.88. He was immediately attacked by a fighter but, skilfully evading it, he flew to the assistance of one of his fellow pilots who was being attacked by another fighter. F/O. West destroyed this attacker. Whilst returning to base he observed one of our pilots afloat in his dinghy, whereupon he passed information as to the position. F/O. West then flew on and made a safe landing at base. This officer has destroyed at least seven enemy aircraft.

DISTINGUISHED FLYING CROSS.

Act. Sqn Ldr. P. B. LUCAS, R.A.F.V.R., No. 249 Sqn.—In July, 1942, Sqn. Ldr. Lucas displayed great courage in an engagement against three bombers escorted by 14 fighters. He unhesitatingly led his squadron through the enemy's fighter escort and, diving down they destroyed all three bombers, two of them falling in flames. Sqn. Ldr. Lucas has destroyed three hostile aircraft and damaged seven others.

P/O. B. H. HAY, R.N.Z.A.F., No. 3 Sqn.—P/O. Hay has participated in a large number of operational sorties and has completed many successful intruder operations over enemy territory. He has destroyed four enemy aircraft, probably destroyed one and damaged two others. This officer is a valuable pilot and an inspiration to his colleagues. He is cool, skilful and possesses marked courage and devotion to duty.

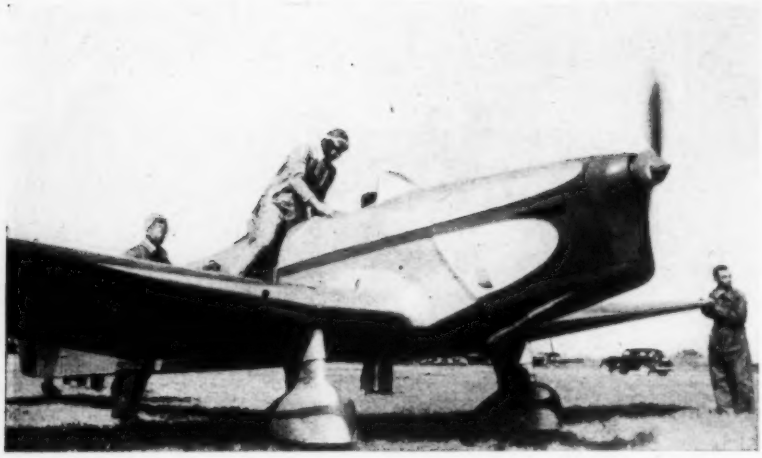
P/O. J. G. SMITH, R.C.A.F., No. 214 Sqn.—One night in June, 1942, P/O. Smith was captain of an aircraft detailed to attack a target in the Ruhr. Whilst flying over enemy territory his aircraft was attacked by an enemy fighter whilst at a height of 17,000 feet. The fighter made repeated attacks in quick succession but was driven off by fierce and accurate fire. The fighter is believed to have been destroyed.

Another enemy aircraft then took up the attack and opened fire from close range. P/O. Smith's aircraft sustained severe damage. The front gunner and flight engineer were badly injured, and the port outer engine caught fire. The flames from the engine assumed dangerous proportions, but, after the propeller fell off, the fire subsided considerably. Despite the damage sustained, P/O. Smith displayed excellent airmanship, and flew the aircraft back to this country, where he made a successful forced landing. This officer's skill, coolness and gallantry in the face of trying circumstances were of a high order. He has participated in several sorties, and has always shown great determination to press home his attacks against the enemy.

F/O. I. A. SLAUGHTER, No. 203 Sqn.—This officer has at all times displayed great devotion to duty. In June, 1942, F/O. Slaughter skilfully located and shadowed an Italian naval force and passed on vital information which enabled formations of our aircraft to attack the naval force without delay. Throughout he showed great operational efficiency.

P/O. J. A. T. MEREDITH, R.A.F.V.R.—One night in May, 1942, P/O. Meredith, as captain of an aircraft carried out an attack on a target in Cologne. On the return journey his aircraft was badly damaged and two of his crew were wounded. Despite this, P/O. Meredith, with great skill and determination, flew his damaged aircraft for over

A Hawker Hurricane of the Egyptian Air Force. The markings are the same as those of the R.A.F. with the addition of a crescent and three stars in the red centre of the roundels.



A Miles Magister which was flown at the Eighth Congress of the Turkish Air League at Ankara. The Magister is being manufactured in Turkey under licence from Phillips and Powis, Ltd.

two hours through searchlights and intense anti-aircraft fire. He eventually landed at an airfield near the English coast without further damage to his aircraft or injury to his crew.

Act. Flt. Lt. P. J. STANBURY, R.A.F.V.R., No. 501 Sqn.—This officer has completed a large number of operational sorties, comprising fighter sweeps, escorts to bomber aircraft and attacks both on shipping and land targets. He has led his flight with skill and judgment, while his determination to engage the enemy, whatever the circumstances, has set a worthy example.

F/O. W. J. STEVENS, R.C.A.F., No. 17 Sqn.—F/O. Stevens has led his section in attacks on enemy shipping with great determination. In June, 1942, he participated in an attack on an Italian warship, scoring a hit; he also scored a hit on a merchant vessel which subsequently sank. Some time afterwards, he attacked and disabled another enemy vessel. On each occasion F/O. Stevens flew through a heavy barrage to accomplish his task.

W/O. F. E. HOGG, R.N.Z.A.F., No. 418 (R.C.A.F.) Sqn.—As an observer, W/O. Hogg has completed a large number of operational sorties against targets in Germany. He has participated in numerous operations against enemy airfields in Northern France, Holland and Belgium. He has always displayed great courage, while his persistence and skill in bombing enemy airfields at night have been most marked.

Act. Sqn. Ldr. P. R. W. WICKHAM, No. 111 Sqn.—This officer is a fine leader and a courageous fighter. Whilst serving in the Middle East he destroyed at least nine and damaged many other enemy aircraft. Since his return to this country Act. Sqn. Ldr. Wickham has completed many sorties, during which he has displayed fine leadership and a magnificent fighting spirit.

Act. Flt. Lt. M. COTTON, R.A.A.F., No. 17 Sqn.—This officer displayed great courage and devotion to duty during the fighting in Burma. On one occasion his airfield was attacked by a strong force of Japanese aircraft. Flt. Lt. Cotton immediately took off and engaged the enemy alone. After shooting down a bomber, his aircraft was attacked by ten fighters. A burst of fire from one of them punctured both petrol tanks in his aircraft, while Flt. Lt. Cotton's left leg was shattered. Despite this, he succeeded in making a perfect landing on the airfield. Earlier the same day this officer distinguished himself during a raid on Moulmein airfield by our aircraft.

Flt. Lt. R. A. YATES-EARL, No. 226 Sqn.

P/O. K. H. HOUGHTON, No. 226 Sqn.

In July, 1942, Flt. Lt. Yates-Earl, P/O. Houghton and Sgt. Leaver were pilot, navigator and wireless operator/air-gunner respectively of the leading aircraft of a section of bombers which carried out a low-level attack on the airfield at Bergen Alkmaar. The operation, which was executed in daylight without fighter protection or cloud cover, called for high qualities of leadership and resolution. On nearing the target area, whilst flying at a very low level, severe opposition from the enemy's anti-aircraft defences was encountered.

His aircraft was hit, but, undeterred, Flt. Lt. Yates-Earl flew on to the target under the able guidance of his navigator. From the lowest possible altitude he enabled his gunner to deliver effective fire at enemy aircraft in dispersal shelters, which were also bombed and set on fire.

Shortly after leaving the target, Flt. Lt. Yates-Earl observed an enemy fighter in close pursuit of an aircraft of his section which had been severely damaged and was incapable of increasing its speed. He immediately drew into protective formation and directed Sgt. Leaver to bring his guns to bear in defence of the damaged bomber. A running fight ensued for some 35 miles out to sea. Flt. Lt. Yates-Earl displayed the highest conception of his duties as a leader, whilst he was most ably supported by P/O. Houghton and Sgt. Leaver, both of whom showed gallantry and fortitude.

DISTINGUISHED FLYING MEDAL.

Sgt. E. LEAVER, No. 226 Sqn.—For citation see Flt. Lt. Yates-Earl.

Flt. Sgt. P. E. G. DURNFORD, No. 124 Sqn.—Flt. Sgt. Durnford has completed many operational sorties, during which he has destroyed at least three enemy aircraft. This airman has at all times displayed great keenness and skill in his engagements with the enemy.

Flt. Sgt. B. J. HULL, No. 124 Sqn.—This airman has completed many sorties, and has destroyed three hostile aircraft. His keenness and devotion to duty have been outstanding.

Sgt. J. F. BARRICK, R.C.A.F., No. 17 Sqn.—During the campaign in Burma this airman displayed exceptional keenness to engage the enemy. During a raid on Mingaloon, in March, 1942, he destroyed an enemy fighter in the air and probably destroyed another fighter and damaged a bomber on the ground. During an engagement over Loiwing he shot down an enemy aircraft which was closing in on one of his fellow-pilots. Sgt. Barrick himself was attacked by two fighters. During the combat his engine failed, and he was compelled to make a landing. Although almost blinded by oil, he succeeded in his purpose without the assistance of flaps. The enemy continued to fire at him whilst he was on the ground. Although suffering from shrapnel splinters and the effects of hot oil on his face, chest and arms, Sgt. Barrick walked for some two hours until he reached some Chinese troops. Throughout he displayed great courage and fortitude. He has destroyed five enemy aircraft.

Sgt. J. E. WILLIAMS, No. 115 Sqn.—Sgt. Williams was captain of an aircraft detailed to attack Bremen one night in July, 1942. The objective was successfully bombed, but, while still over the target area, his aircraft sustained damage. The port engine, hydraulics and flaps were put out of action. Height was lost from 10,000ft. to 4,000ft. before Sgt. Williams was able to regain control of the aircraft. Despite all his efforts, height could not be maintained, and in taking the necessary avoiding action from anti-aircraft fire the aircraft had descended to 1,000ft.

In spite of his difficulties, Sgt. Williams decided to attempt to reach this country. By superb airmanship he succeeded in regaining his base, whilst flying at only 100ft., and executed a perfect landing with one engine and without the assistance of flaps. This airman displayed great courage and determination throughout this hazardous experience. He has completed numerous sorties, and has displayed these high qualities throughout.

Sgt. P. M. GAWITH, R.N.Z.A.F., No. 3 Sqn.—This airman has participated in many operational sorties, both by day and night. He has taken part in successful intruder operations against the enemy in Germany and German-occupied territory. He shows great keenness at all times to engage the enemy, and has destroyed two aircraft and damaged two others. By his courage and initiative he sets an excellent example.

Sgt. F. M. GRIGGS, R.A.A.F.
Sgt. A. O'HARA.
Flt. Sgt. J. I. C. WADDICAR.
Sgt. R. WATSON.
Sgt. T. N. C. PROSSER.
Sgt. W. WILDEY.
All of No. 214 (F.M.S.) Sqn.

These airmen were members of the crew of an aircraft detailed to attack Bremen on the night of June 27th, 1942, Sgt. Griggs acting as captain. The objective was successfully bombed, but, over the target area, the aircraft sustained much damage from anti-aircraft fire. One of the starboard engines was hit and put out of action. Shortly afterwards, the bomber was subjected to an attack by an enemy fighter, fire from which caused further damage. Almost immediately a second fighter opened fire, and Sgt. Wildey, the first wireless operator, was wounded in the arm. The first fighter then returned to the attack, but was met with a long and vicious burst from Sgt. Waddicar's guns, which sent the enemy aircraft spinning towards the ground, where is exploded on impact.

Some time later, after crossing Holland, Sgt. O'Hara, the navigator, who had skilfully guided his captain thus far, observed two enemy fighters closing in. Sgt. Watson, who was tending the injured wireless operator, immediately attempted to man his turret, but it was jammed. With the assistance of Sgt. O'Hara, who held his legs, he managed to reach his guns, and he then delivered an effective burst at the leading fighter, which caused it to dive towards the sea completely out of control. Meanwhile, Sgt. Waddicar, with commendable ingenuity, had temporarily repaired one of his guns which had failed, and opened fire at

Weather predictor. Dr. N. K. Johnson, Director of the Meteorological Office.

AVIATION

the second aircraft from close range. The attacker dived away and exploded before hitting the water.

The bomber was not yet out of danger, being subjected to machine-gun fire from the sea. A few minutes later another fighter appeared, opening fire with a long burst, but Sgt. Waddicar's return fire caused it to break off the engagement. Sgt. Griggs, displaying fine airmanship, eventually flew his severely damaged aircraft safely back to base, where he made a crash landing. Throughout the operation, these airmen displayed unflinching courage, great fortitude, and splendid team work in foiling the attacks of five enemy fighters, three of which were shot down. Their conduct upheld the highest traditions of the Royal Air Force.

THE KING has been graciously pleased to approve the following awards:—

GEORGE MEDAL.

Sqn. Ldr. F. G. MOGG, M.R.C.S., L.R.C.P., A.A.F.

One night in May, 1942, an aircraft crashed on the edge of an airfield and immediately burst into flames. Sqn. Ldr. Mogg (the station medical officer), accompanied by L.A/C. Rowland, hastened to the scene and found that three members of the crew had been thrown clear of the main part of the wreckage and killed; a fourth member had managed to extricate himself from the tail turret. A wireless operator was, however, trapped in the blazing fuselage, being entangled by his harness and flying clothing, which was burning.

Showing complete disregard for their own safety, Sqn. Ldr. Mogg, clad only in overalls over his pyjamas, and L.A/C. Rowland went into the blazing wreckage to rescue the unfortunate airman. By lying flat on the floor and using a greatcoat as a shield, L.A/C. Rowland was able to afford some protection for the medical officer whilst the latter administered morphia to the injured operator. L.A/C. Rowland afterwards assisted Sqn. Ldr. Mogg in cutting the airman free and in extricating him from the aircraft.

During the time that this officer and airman were working in the wreckage two oxygen bottles exploded within a few feet of their heads, and there was grave danger than others might have done so at any time. Sqn. Ldr. Mogg was badly scorched and sustained burns to his hands and wrists, but, despite this, he accompanied the dying wireless operator during the journey by ambulance to hospital some six miles away. He then fainted and had to receive medical attention. L.A/C. Rowland was also burned on the hands and wrists. Both rescuers displayed gallantry of a high standard.

Sgt. R. W. BAXTER, R.A.A.F.—Sgt. Baxter was the captain of a bomber which had made a successful raid on Germany. When nearing base the port engine, which had been hit by fire from the enemy's ground defences, caught alight. Sgt. Baxter proceeded to land the aircraft, but, in the semi-darkness, he was unable to observe that the runways on the airfield were obstructed. The aircraft caught fire on impact with the obstruction. Five of the crew, including Sgt. Baxter, got out through the pilot's escape hatch, but the wireless operator, who tried to escape through a lower hatch, became trapped. The aircraft was now burning furiously, ammunition and pyrotechnics were exploding, and the petrol tanks were liable to explode at any moment.

Sgt. Baxter, showing complete disregard for his own safety, re-entered the aircraft and remained inside for at least five minutes before he succeeded in releasing the wireless operator and pushing him through the pilot's escape hatch. He only managed to get clear himself just before the petrol tanks exploded. During his efforts to release his companion Sgt. Baxter sustained extensive second degree burns to his hands and face for which treatment in hospital was necessary. The unselfish heroism displayed by this airman undoubtedly saved the life of his comrade.

BRITISH EMPIRE MEDAL (MIL.).

L.A/C. P. N. ROWLANDS.—For citation see Sqn. Ldr. Mogg.

Act. Flt. Sgt. H. G. W. CAGBY.—An aircraft was set on fire during an enemy air attack on an airfield in Malta. Whilst a second wave of bombers were diving to attack, Flt. Sgt. Cagby, displaying complete disregard for his own safety, removed about fifty 40 lb. bombs from the vicinity of the aircraft. His courageous and prompt action prevented an explosion and thereby saved valuable property. He has on many other occasions displayed courage and devotion to duty which have set a fine example.

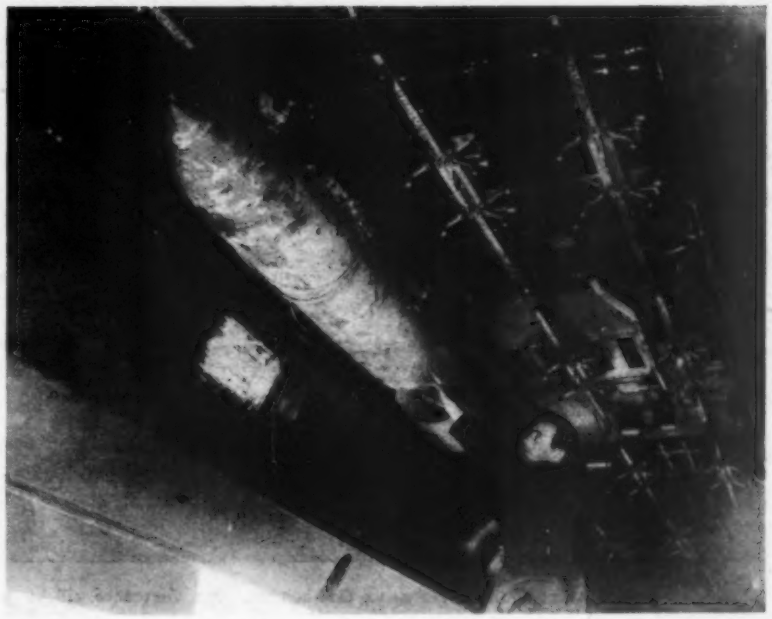
Sgt. W. R. SMITH.—Sgt. Smith has displayed courage and devotion to duty of a high standard during intense and almost continuous enemy air attacks on Malta. He has shown complete disregard for his personal safety and set an excellent example.

Cpl. C. E. CASEY.—In April, 1942, a Henley aircraft was forced to alight on the sea some 800 yards from the shore. The aircraft turned over on to its back on alighting and the dinghy was lost. One member of the crew was apparently unable to swim and, supported by his life jacket, was soon in an exhausted condition some two or three hundred yards out. Cpl. Casey swam out towards the airman and, when he had nearly reached him, an uninflated dinghy was dropped nearby from an aircraft. Cpl. Casey swam to the dinghy but, not knowing how to inflate it, was compelled to abandon it. He then swam on to the airman, who by now had ceased to show any signs of life. Cpl. Casey persisted in his rescue efforts, however, and was later joined by another airmen who had swum to his assistance. Between them they were able to tow the unconscious airmen towards the shore. Despite strenuous efforts against the strong currents, the attempt proved almost beyond their strength and it was only with the further assistance of an officer than their unfortunate comrade was brought to the shore. The attempt to save his life proved unsuccessful, but Cpl. Casey took a very great risk in going to his assistance on a stretch of coast notorious for dangerous currents, and showed a high example of gallantry.

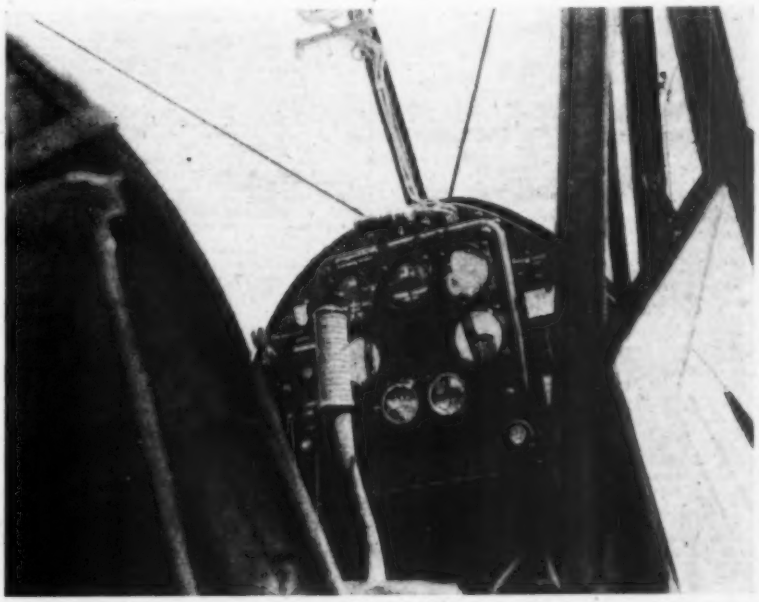
Cpl. J. FERGUSON.
Cpl. A. E. G. RODERICK.
A/C.2 H. A. SIMPSON.

In April, 1942, an Oxford aircraft which was taking off collided with another and immediately caught fire. It was extensively damaged and was broken in two just in front of the door, thus completely cutting off the retreat from that exit. The pilot was unable to move, however, as he was rendered unconscious by the crash. The petrol tanks of both aircraft were pierced and the escaping petrol, which ignited immediately, enveloped the whole aircraft.

Despite the fierceness of the fire, Cpls. Ferguson and Roderick and A/C.2 Simpson climbed on to the wing of the aircraft and, with their bare hands, broke open the window. Their efforts to rescue the pilot were greatly handicapped as he was strapped in the machine and wearing a jacket-type parachute harness which was attached to his seat-type parachute. Nevertheless, these airmen succeeded in extricating him and undoubtedly saved his life by their prompt and gallant action.



Fitting a 2,000 lb. bomb into the racks of an Avro Manchester. This photograph gives an excellent impression of the enormous capacity of the Manchester's bomb bay.



The cockpit of a Fieseler Storch captured in Egypt. Designed especially for short take-off and landing runs, the Storch is used extensively for communication work by the German army.

SERVICE AVIATION

A sunset impression of a Vultee Vengeance dive-bomber. The Vengeance will be the standard dive-bomber of the R.A.F.

AWARD OF A FOREIGN DECORATION.

HIS MAJESTY THE KING has granted unrestricted permission for the wearing of the undermentioned decoration, conferred on the officer indicated in recognition of valuable services rendered in connection with the War:—

CONFERRED BY THE PRESIDENT OF THE POLISH REPUBLIC.

Virtuti Militari—Fifth Class.

Grp. Capt. A. M. WHAY, M.C., D.F.C. and Bar, A.F.C.

Roll of Honour

Casualty Communiqué No. 144.

THE Air Ministry regrets to announce the following casualties on various dates. The next-of-kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Royal Air Force

KILLED IN ACTION.—P/O. G. M. Bain; Sgt. B. Bricklebank; Sgt. D. J. Coates; Sgt. E. A. L. Fairman; Sgt. K. Ludwell; Sgt. R. E. Neathway; Sgt. J. W. Watson; P/O. R. Wigington.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sqn. Ldr. C. R. Davies; Sgt. W. L. Evans; Sgt. J. Goodbrand; P/O. F. D. Hammersley; P/O. D. R. J. Harper; Sgt. A. E. Hill; Sgt. T. F. Houldsworth; Sgt. D. S. Kay; Sgt. D. R. Kelly; P/O. H. Knight; Sgt. A. P. McGregor; Sgt. G. S. H. Mott; Sgt. F. E. Rolfe; Sgt. G. S. Stephens; Sgt H. Whittaker.

WOUNDED OR INJURED IN ACTION.—F/O. A. H. Baird; Sgt. D. D. P. Bowie; Sgt. I. A. Campbell; Sgt J. A. Fernie; Sgt R. L. Gifford; Flt. Lt. S. R. Peacock Edward; Sgt. R. J. Rayner; P/O. W. B. Rogers; Sgt. G. L. Woolven.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Wing Cdr. E. L. Hyde, D.F.C.; Flt. Sgt. J. Lee; Flt. Sgt. J. E. Paget; Sgt. J. W. Walton.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. W. Chance; Flt. Sgt. R. V. G. Dennis; Sgt. E. Goulden; Sgt K. Nisbett; P/O. H. A. Schumm; P/O. J. Sheffield.

MISSING.—Act. Flt. Lt. C. H. Adcock; Sqn. Ldr. K. Ault; Sgt. E. R. Baird; P/O. J. A. S. Banting; Sgt. F. Bennett; Sgt. D. H. Bird; Sgt. T. C. Bird; Sgt. H. A. Booth; P/O. F. A. Boulton; Sgt. E. C. Bratt; Sgt. P. H. Bullock; Flt. Sgt. R. H. W. A. Camm; Sgt C. B. Climie; Sgt. J. W. Cornthwaite; Sgt. R. C. Darnell; Sgt. P. B. Dauncey; Sgt. T. P. W. Davies; Sgt. R. Day; Act. Sgt. P. G. Detmold; Sgt. E. Downes; Sgt. G. M. Edwards; Wing Cdr. W. R. Farley, D.F.C.; Sgt. D. R. Freear; P/O. P. W. Freiberg; P/O. T. G. Grantham; Sgt. A. H. Greenfield; Sgt. R. V. Hagborg; Sgt. D. S. Hall; Act. P/O. E. C. L. Hebblethwaite; P/O. G. J. P. Henry; P/O. F. W. C. Hill; Sgt. A. R. Holmes; Sgt. W. L. Huxley; Sgt. J. M. C. Jenkinson; Sgt. S. A. B. Kellie; Sgt. R. Kinsey; P/O. F. G. Knight; Sgt. J. Lewis; Sgt. E. McDermott; Sgt. T. Macfarlane; Sgt. J. McIntyre; Sgt. P. McKenny; Sgt. J. R. McRae; Flt. Lt. J. G. Mackid, D.F.C.; F/O. F. I. Malcolm; Sgt. W. K. F. Marshall; P/O. C. H. Maynard; Sgt. F. R. Mills; P/O. P. J. Moore; Sgt. J. Morris; Sgt. W. L. Munns; Sgt. H. A. J. Northcott; P/O. W. E. N. Pasterfield; Act. Flt. Lt. M. R. M. Pooles; F/O. J. A. Pulton; Sgt. D. E. Rarity; Sgt. S. G. Richardson; Flt. Sgt. C. M. T. Rogers; Sgt. J. E. T. Saunders; P/O G. G. Shore; Sgt E. C. Smith; Sgt. J. J. Smith; Act. Sqn. Ldr. A. J. D. Snow; Sgt. N. Spray; Sgt. R. Staley; Sgt. R. Stone; P/O. T. N. Tree; Sgt. B. V. H. Tweedie; P/O. R. B. Underwood; Sgt H. R. F. Wakeford; Sgt. J. W. Wareham; Sgt. S. D. Whiles; Sgt A. Wilstrop; Sgt. J. H. Wisher.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. E. Boaler; Sgt. A. Longhurst.

KILLED ON ACTIVE SERVICE.—L.A/C. L. C. Atkins; Sgt. L. A. Barnfield; P/O. L. Bescoby; Act. Flt. Lt. H. W. Biggs; Sgt. G. W. Bogger; L.A/C. E. C. Bousfield; P/O. R. B. Bowran; Act. Flt. Sgt. F. A. Brown; P/O A. R. Brydon; Sgt. J. F. Collins, L.A/C. R. J. Cook; Flt. Sgt. H. L. Cox; Sgt. N. Elcock; Flt Sgt. H. T. Gibbs; W/O. C. S. Gill; L.A/C. H. N Hardaker; A/C.1 B. Hawcroft; P/O. K. W. Heywood; A/C.2 H. Holmes; A/C.2 E. Hopkins; Sgt. W. F. G. Highes; A/C.1 C. V. John; Sgt. A. M. Johnston; P/O. W. D. Kerr; Sgt. C. G. McAllister; L.A/C. W. B. McFarlane; P/O. J. F. McGlashan; Cpl. J. F. Martin; Sgt. D. J. H. Mott; A/C.1 A. Needham; P/O. O. A. Noah; L.A/C. J. Norman; Sgt T. E. A. O'Coy; A/C.2 F. Palfreyman; Sgt. A. E. Payne; Sgt. G. Penman; Act. Sgt. R. G Rider; Sgt C. G. Roughan; Sgt. C. J. Scattergood; A/C.1 C. W. Shufflebotham; Sgt. J. E. Sketcher; Sgt. W. J. H Smart; P/O. H. J. Snelling; Sgt. A. H. A. Stafford; Sgt. J. McW. Stewart; Sgt. L. R. Tait; Sgt. D. M. Telford; A/C.2 S. Walker; Sgt. J. E. Walton; P/O. H. H. Whitfield; A/C.1 G. Wright.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.2 C. E. Bell; Sgt. J. Blair, D.F.M.; A/C.1 R. S. Brown; P/O B. S. Cadman; A/C.1 J. C. Campbell; A/C.1 H. Handy; Sgt. A. D. Jenkins; Flt Sgt. G. W. Jones; Sgt. D. C. Marsden; A/C.2 D. Moss; A/C.1 S. Starkey; Cpl. L. W. Taylor; L.A/C. R. S. Welborn; A/C.1 W. E. Williams; A/C.1 F. T. Wood; Sgt. W. H. Woodward.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. R. E. Lowman.

DIED ON ACTIVE SERVICE.—A/C.2 J. Booth; A/C.2 L. H. Cook; Cpl. T. E. S. Dow; Act. Cpl. S. Ellison; A/C.2 J. R. H. Fairweather; A/C.1 J. Footer; L.A/C. A. G. Gardner; L.A/C. W. J. Harper; A/C.2 H. E. Joyce; A/C.2 G. Lanckham; L.A/C. R. MacLeod; L.A/C. R. Macmillan; A/C.2 W. Paterson; L.A/C. W. Preece; A/C.1 A. H. Prother; W/O. A. H. Scrutton; Cpl. G. Sivewright, D.F.M., M.M.; Cpl. J. S. Smith; A/C.2 W. C. A West; A/C.1 J. C. White.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. A. Lees.

Royal Australian Air Force

KILLED IN ACTION.—F/O. H. G. Pace; Sgt. T. G Small.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. R. Devenish-Meares.

WOUNDED OR INJURED IN ACTION.—Sgt. D. E. Irvine; Sgt. A. L. Moyle.

MISSING.—Sgt. H. K. Bedwell; P/O. G. M. Briggs; P/O. G. S. Burgan, D.F.C.; P/O. H. L. Croydon; Sgt. G K. Eckersley; P/O. D. H. Evans; Sgt. H. G. Gordon; Sgt. H. C. Gray; Sgt. W. J. Halliday; Sgt. V. E. M. Henry; Sgt. L. E. McAuley; P/O I. C. Young.

KILLED ON ACTIVE SERVICE.—P/O R. J. Finch; Sgt. W. J. Nicholls.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.1 A. Dennis

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. W. M. Baker.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. M. R. Heinish; Sgt. K. A. McManus.

WOUNDED OR INJURED IN ACTION.—P/O. F. M. Benitz, D.F.C.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. M. Hicks; Sgt. J. H. Smith.

MISSING.—P/O S. G. Goatley; Flt. Sgt. J. R. Kennedy; Sgt. G. R. Lefebvre; P/O. H. R. Millichamp; Sgt. R. A. J. Ribout.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. W. D. Burd; Sgt. G. E. Fallis; Sgt. A. B. Goff; Flt. Lt. J. E. Morgan; Sgt. C. A. Parke; Sgt. G. M. L. Robertson; Sgt. D. J. Taynen; P/O. R. M. Woodhead; P/O. R. E. D. Wright; Sgt. J. R. Young.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. A. G. Bowers; Sgt. R. E. Walton.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. R. E. Williams.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. D. L. Todd

WOUNDED OR INJURED IN ACTION.—Sgt. D. S. Tutty.

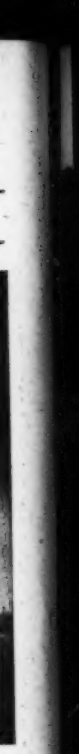
MISSING, BELIEVED KILLED IN ACTION.—P/O. S. S. Mitchell.

KILLED ON ACTIVE SERVICE.—Sgt. H Morrison.

South African Air Force

WOUNDED OR INJURED IN ACTION.—2/Lt. C. A. Golding; 2/Lt. G. W. McGregor.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Lt. J. M. W. Egner.

Indian Air Force

WOUNDED OR INJURED ON ACTIVE SERVICE.—P/O. Joseph